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ARTS, MANUFACTURES, AND COMMERCE.

WORK AND LEARN.

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1867.

"He that goes about to forward agricultural improvement must begin by finding out the true reasons of what is called routine, or the 'custom of the country.' It sometimes happens that these reasons are only accidental, and then you may dismiss them fearlessly; but it often turns out that every-day practice rests on a solid foundation of facts; and then if you make an onslaught on local prejudices, they will be sure to beat you.

"The true course for the agricultural improver is, to take one step at a time, to gain a clear insight into facts by experience, not to try to go too fast, and to trust to the work of time.

"If practice which sets up to do without theory is contemptible, theory without practice is foolhardy and perfectly useless."—*From the Rural Economy of England, Scotland, and Ireland.* By LEONCE DE LAVERGNE.

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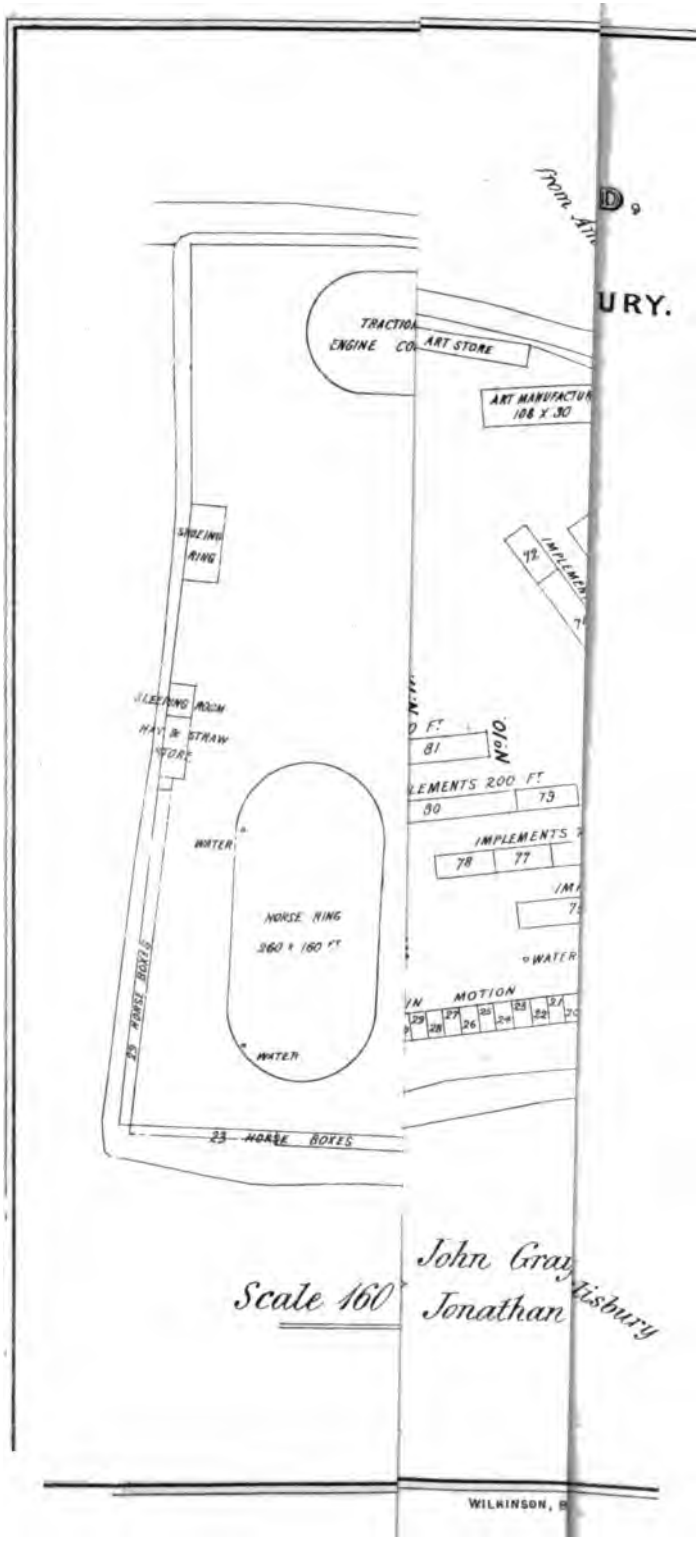
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REPORTS AND PAPERS.

I.—*Report on the Salisbury Meeting.*

THE restrictive measures in relation to cattle-traffic deemed necessary by the Government during the past two years, in the presence of the great scourge which has afflicted the herds of Great Britain in common with those of other countries, have seriously impeded the action and tested the capabilities of the larger Agricultural Societies, especially those maintaining a permanent staff of officers, and regarding the utilisation of a costly accumulated plant as a source of saving or revenue. Happily for the Bath and West of England Society, it possesses in its various departments of agriculture, arts, manufactures, and commerce a vigour and elasticity which have successfully carried it through difficulties and trials at one time deemed almost insurmountable. To have held two meetings in two consecutive years at one place; to have been received by the diocesan and local authorities of Salisbury on a second occasion with even greater cordiality and enthusiasm than on the first; and to have carried both meetings to a successful issue, notwithstanding the absence of horned cattle—the prominent element of attraction at every agricultural show—cannot fail to be regarded by the friends of the Society as a concurrence of most gratifying and reassuring incidents.

In every department the efforts of the executive were nobly sustained by the hearty co-operation of exhibitors, both far-off and near; but it would be unpardonable to omit a passing eulogium on the enterprise and public spirit of the leading agricultural engineers and implement makers, who, notwithstanding the demands of the Paris Exhibition on their time and resources, were ready on the second occasion, as they were on the first, to contribute so largely to the interest and importance of the Salisbury Meeting.* Encouragement more substantial than mere words was, it is satisfactory to know, in many instances, received by them; and one result, already manifest, of the Society's two visits to the interesting city and neighbourhood of Salisbury

* A detailed report on the Implement Department of the Salisbury Meeting 1866, will be found in vol. xiv. of the Society's Journal; thus rendering any special report for 1867 uennecessary.—ED.

is the greatly extended use of labour-saving machines in harvesting and other operations.

Experience acquired in the Secretary's office during the past year tends to strengthen the inference, if not to establish the fact, that if a show of Live Stock be crippled in any of its classes by the operation of exceptional regulations or restrictions, a sympathetic effect will be observed in other classes to which the particular restrictions or regulations are not intended to apply. If, for instance, at the second Salisbury Meeting several breeds or classes of sheep were very inadequately represented, it was, in a measure, attributable to the fact that entries conditionally tendered by well-known breeders, residing at long distances from the place of meeting, were at once withdrawn when it was officially announced that no exhibition of horned cattle would be allowed by the Government. Again, if after the date appointed for the closing of entries the exhibition of cattle had been permitted, yet, partly owing to the discreet caution of many well-known breeders, and partly to the uncertainty which necessarily surrounded the intentions of the Government, the number of cattle eligible to be shown would have fallen very far below the average of previous years.

The reader, however, is less concerned with what might have been the character of the exhibition than with what it was. On this subject the following reports have been received :—

The Horse-Show.

By Colonel Luttrell, Steward of the Department.

However great an attraction the horse-ring may be to the public in general, it was only too evident, from the scarcity of entries in the agricultural classes at Salisbury, that the great breeders in Wiltshire displayed a marked unwillingness to gratify the public eye with a sight of some of those magnificent animals which it is well known the county is so able to produce. Various reasons were assigned for their backwardness to exhibit, on none of which is it my intention to comment in this report; and, indeed, it would be difficult to reconcile some of the excuses made: for, if the smaller amount of prizes offered this year for the agricultural stallion classes could be accepted as a reason, [illegible] same cause could not have accounted for the absence of many [illegible] splendid pairs of horses which we see so frequently [illegible] together on the Wiltshire downs.

The *Agricultural Stallions* in Class 47, though few as compared with the previous year, were quite up to the average of former exhibitions. Of the 2-year old stallions (Class 48), there [illegible] entries which, with the exception of Mr. Ed. Gibbs's

roan horse "Banker," in no way did credit to the two classes between which they stood.

In Class 49, Mr. Holland's grand old mare "Matchless" added another wreath to the many laurels she had so deservedly won, and, although fully realising her name, was followed in the ring by no unworthy competitors.

Alas! alas! for the next two classes, which, from the locality and high prizes offered, promised to be the great feature of the show. It was, indeed, lamentable to see Mr. Lavington's two beautiful roans parading alone in their glory: animals possessing so much merit that, even had there been a good entry, no Wiltshire farmer need have been ashamed of seeing them at the head of their class. In the Young Class, Mr. Gibbs's blue roans, showing great power and activity, were deservedly admired.

In the *Hunter and Hack Classes*, a great revolution has taken place in the prize-sheet; and this year a principle, suggested by a nobleman well known for his thoroughly practical knowledge of all matters connected with the horse and the hound, was entirely adopted by the Society. At previous meetings a 4-year old Class had been added, but until now the stallions and brood-mares had not been discarded; and although I cannot but regret the absence of those which, if properly represented, would materially assist farmers in selecting the best animals to breed from, yet I am bound to confess that the class of horse lately exhibited for producing weight-carrying hunters has not come up to that standard which the high prizes offered by the Society ought to have insured, and that hitherto the classes representing produce have not brought animals into the yard of very great merit. Nevertheless, seeing that most of the prize-takers—with the exception of those last year, when the first and second horses were got by sires previously exhibited at the Society's shows—have come from a considerable distance, I am not yet fully persuaded that the adoption of this principle will very much tend to the improvement of the breed within the area of the Society's operations. You must have the material to work upon; and I am so deeply imbued with the truth of the old maxim which I learnt as a schoolboy—

"Fortes creantur fortibus et bonis est in juvencis, est in equis patrum virtus,"

that I must be allowed to be somewhat sceptical. Time, however, will solve the problem, and I am perfectly willing to give it every opportunity of doing so.

With this digression I will return to Class 52, *Hunters* of any age above 4 years; a very creditable entry of 9, headed by Mr. Sutton's leviathan prize-taker "Voyageur," whose show-yard winnings have, during the last two seasons, amounted to 500*l.*

No one could but admire his perfect symmetry and levelness of shape, combined with good legs and unmistakeable good temper; but I should have much preferred him for a hunter, if he had shown the same freedom of action and capabilities for going through dirt as his rival, Captain Heygate's excellent black horse, "Mountain Dew"—an old friend in the Bath and West of England horse-ring, and one likely to distinguish himself over any country in England. I must not leave this class without mentioning Mr. W. Paull's "Plaudit," and Mr. R. Melsome's rare, short-legged horse "Croydon," both animals of the right stamp, famous movers, with sufficient quality to put them in the right place when called upon.

The 4-year olds, though not altogether a bad lot, were not so numerous or good as usual. Captain Heygate's black horse, "Denmark," as on two former occasions—last year as a 3-year old, and the year before at Hereford as a 2-year old—won the first prize. He undoubtedly is a fine colt, but does not give the same promise of making a hunter as his own brother, exhibited in the last Class. Mr. Luxton's filly, by the "Bald-faced Stag"—evidently amiss—will, if I mistake not, some of these days, prove herself worthy of the matchless hunting-blood from which she is descended.

Amongst the 3-year olds, Captain Heygate again led the van with his good-looking colt "Britannia," half-sister to the other two, with good legs and quarters, and well-bred enough for anything; having a weakness for good shoulders and plenty of bone, the other two chesnuts did not much strike my fancy.

No entry for the next Class 55, which I was not much surprised at: a difficult combination to arrive at, under 15 hands, calculated to carry not less than 15 stone. In vain do I look for them in the market; I always find either quality or substance deficient. Class 56, Hacks not exceeding 15 hands, to carry 12 stone; by far the best entry I have ever seen, for until last year we have barely had competition.

The race this year lay between the two Messrs. Melsome, and [illegible]as won by a head by Mr. R. Melsome's "Golden Locks," by [illegible] Ratan," a handsome, well-bred animal, but very inferior in [illegible]ction to her rival "Little Wonder," who slipped round the [illegible]ing v[illegible] [illegible] easy style, combining speed with safety, and [illegible]ivin[illegible] [illegible]dea of being able, with a light weight on his [illegible] puzzl[illegible] [illegible]ay of the cracks in a fast twenty minutes.

[illegible] [illegible]he [illegible], the less said the better, if those exhibited [illegible] specimens of the neighbourhood. Whilst I congratulate [illegible]kes on possessing an animal more remarkable for its [illegible] [illegible]an its beauty, I should venture to recommend the [illegible]ltshi[illegible] [illegible]reeder[illegible] [illegible]o take [illegible] trip [illegible] [illegible]he wilds of Exmoor, where

they would have an opportunity of studying the true type, the deficiency of which was so apparent at Salisbury.

Down and Dorset Sheep.

By Henry Fookes, Steward.

The show of *South Down Sheep* was, as regards quantity, quite up to the average; but Sir W. Throckmorton had little difficulty in taking the prizes, his sheep being of good size and first-rate quality. Lord Radnor and several of our West Country breeders were not in their usual force. The show of *West Country Downs* was excellent; indeed, on looking at the catalogue, and seeing the list of exhibitors, nothing else could be expected. Hence the judges had a difficult task in awarding the prizes. Very great improvement has taken place in this breed of sheep, but Mr. Coles took the lead with a fine, grand-looking shearling of immense size and quality, but not right about his head. Mr. Rawlence took second honours with a very complete level sheep, not so large as the winner, but one likely to see a better day. In the Old Ram Class, Mr. Rawlence was first with a fine sheep, but was closely run by Mr. Canning. The Ewes were as good as could be; decidedly the best class ever shown, reflecting great credit on all the breeders. It is doubtful, indeed, whether such a show of Hampshires will ever again be seen.

The *Shropshires* did not show in at all their usual force, and the less said about them the better.

The *Oxford Downs* were represented by Mr. George Wallis, who carried off two first prizes and one second prize. The only pen of Ewes was that shown by Mr. Fletcher, of Fovant.

The *Dorset Sheep* were a show in themselves; probably the very best lot ever exhibited, taking all the classes together. Mr. Danger was first in the Ram Class, closely pressed by Messrs. Pitfield, Bond, and Mayo; but he was fairly beaten in the class for Shearling Ewes by Mr. Mayo, who exhibited two pens. His first prize pen was everything that could be wished for as regards quality, while some of the Dorset breeders preferred his highly-commended pen, as being of a larger size than that to which the second prize was awarded. Messrs. Danger and Co. will have to look well to their sheep to keep out of Mr. Mayo's way at future exhibitions.

Long-Wool Sheep and Pigs.

By the Senior Judge.

In Long-Wool Sheep the show fell short of what might have been expected, and contrasted rather unfavourably with the

previous exhibitions of the Society. These remarks, however, apply to the Leicesters and other long-woolled classes. The Cotswolds were well represented; indeed, at no previous exhibition of the Society has there been so good a lot.

Leicesters.—In the Shearling Class there was little competition. Mr. Gould's first prize sheep is a useful, heavy-fleshed animal, with plenty of substance and a very fine fleece, but his neck is not nicely set on; still he was far the best of the class.

In the Class for *Older Rams* there were but 2 entries, both the property of Mr. Gould. The one which took the first prize is very neat, with much that is useful, and would have held a good position if he had met with competition.

In the *Shearling Ewe* Class Mr. Gould was again alone. He exhibited a remarkably neat pen; one of the lot was faulty in its neck and light in flesh, but the other four were very level and uniform.

Cotswolds.—In the Class for Shearling Rams Mr. J. King Tombs's first prize sheep combines all the essentials of a thoroughly good animal; a better is rarely to be seen. Mr. Herbert's second prize was very closely run by another shown by Mr. Tombs, and by Mr. Gillett's very clever shearling. They both were highly commended, and the Judges thought so well of the class that they commended the lot.

In the *Older Ram* Class Mr. King Tombs again took the lead with a wonderfully good 3 year 3 months sheep that completely distanced all his competitors; while Mr. Gillett was second with a very strong sheep of great size, but with a fleece far from good. Mr. Gillet's two highly-commended sheep well deserve the praise bestowed on them by the Judges.

For *Shearling Ewes* there was no competition. Mr. Gillett took both prizes, but the animals did not possess so high a standard of merit as the male animals from the same flock.

The *Other Long-Wools* was the weak point of the show. It is quite impossible to say to what class the animals exhibited really belong; they were evidently a cross-bred lot, and there was no merit in any of them.

The show of Pigs was unquestionably the very best that the Society has ever brought together, both as regards numbers and quality.

In the *Large Breed* (Boars exceeding 1 year old), Mr. Duckering, of Lincolnshire, took both prizes with two extraordinarily fine animals: the one to which the first was awarded being as near perfection as possible; but it is very questionable if he is of a *pure Large Breed*, and whether he does not properly belong to the Middle Breed.

In the Class for Boars under 1 year old, the first prize went to a very capital Berkshire, belonging to Mr. Arthur Stewart,

standing on beautiful clean legs, with a good head and nice skin. Mr. Humphrey's second prize, also a Berkshire, is a very perfect animal. Mr. Stewart's highly-commended No. 219 has great substance and a very good head, but stood on bad bone. It is more than probable that No. 224—a 5 months 3 weeks old Pig belonging to Mr. King Tombs—will be the best of the class in another six months time.

In *Breeding Sows* Mr. Duckering again took first and second prizes with two immense animals, but the remark made relative to his Boar also applies to the first prize Sow. I do not think her to be of the legitimate Large Breed; but, whatever the breed, the two defied all competitors in a thoroughly good class.

In the *Pens of Sows* Mr. Duckering again deservedly took first honours, and Mr. Hewer came second with two sweet Berkshires.

The *Special Prizes offered by the Local Committee* did not bring together so good a lot of Berkshire Boars as those exhibited in the Class for Large Breeds generally. Mr. Yells's 5 months 3 weeks old Boar, which took the prize, promises to grow into a very perfect animal; but the older pigs in this class were not up to what was expected, as the Berkshire is quite the pig of the district.

The *Breeding Sows* well sustained the reputation of the breed; Mr. King Tombs being first with an animal that no one could mistake, and the second was awarded to a Sow of great merit belonging to the Marquis of Aylesbury. Sir William Throckmorton, Mr. W. Yells, and Mr. H. Rivington were highly commended for their first class Sows, and the Judges could not refrain from commending the whole class.

For the *Pen of Sows* the honours were divided between Mr. Arthur Stewart first, and Mr. Yells second, in a very capital class.

Small Breed.—In the Class for Boars above 1 year old there were but 2 entries: Mr. Duckering's first prize Pig quite deserving the honours awarded him, for he has very few equals.

Boars under 1 year old. Mr. Edmund Coles took the first prize with a very neat black Boar, and Captain Richard Pelham Warren was second with a very fine-bred Yorkshire white. Mr. Duckering exhibited a very neat young Pig, but he belonged to the Large Breed.

In the *Sow* Class Mr. Duckering was again deservedly first, with as neat a Sow as can be found; and Mr. Coles second, with a very clever black, but rather light in her flesh.

Pens of two young Sows.—Here Mr. Duckering, who had up to this point been unconquerable, had to yield to the Earl of Radnor, first; and Captain Pelham Warren, second; Mr. Duckering being highly commended.

II.—*Report on the Arts Department, Salisbury*, 1867.

THE fact of the Society having to meet twice on the same ground in two successive years, rendered the occasion of the second Exhibition one of considerable anxiety and some doubt. The continued absence of cattle, too, added another motive to the Executive to invest their several departments with more than usual interest, and the Stewards of Arts fully sharing this anxiety, spared no effort to render that part of the exhibition entrusted to them as complete as possible. The effect of novelty which, in all cases, more or less, helps a *first* exhibition, had on this second occasion been to a certain extent worn off; hence intrinsic excellence and that alone could be depended upon for success. To secure this was therefore the great endeavour of the officers of the department, and they are now happy to report that they entirely succeeded.

The arrangements this year were with some little modifications similar to those of last, viz., No. 1 building containing works of Fine Arts admitted free of charge; and No. 2 building devoted to works of Art manufacture, the space for which was charged 1*s.* per square foot. The receipts from such fees this year, amounting to 68*l.* 18*s.*, exceeded those of last. The sum received on the present occasion for the sale of pictures, including those disposed of through the Art Union, was 176*l.* 15*s.* 5*d.*; not so large an amount as that received in 1866.

The increased fees for space received on this second occasion cannot but be taken as highly satisfactory to the promoters of the department, since it shows that exhibitors increase in number after having had experience of the advantages of the exhibition as a means of making their wares more generally known.

Fine Arts.—On this occasion 453 pictures were exhibited, a somewhat smaller number than that of last year; and though there might be no one work that took the same high position as a work of Art as did the 'Stray Sheep,' yet as a whole the merits of the present exhibition were higher than those of the former one. Little or no assistance was this year obtained from private sources by the loan of pictures, the works being nearly all contributed by the artists themselves; thus affording some proof that the sales effected are such as to make it worth while for artists to exhibit. The examples in oil and water colours were nearly equal in number, and many of them productions by artists of acknowledged reputation. It is not desirable that this report should descend to minute criticism of particular works; but the names given below will be sufficient to indicate the high character of the exhibition which indeed, as a whole

has never been surpassed. It is gratifying to mention that the stewards have observed that some of the artists who exhibited their first efforts in this Society are now men fast rising into eminence, and their works realise high prices; nor can it be otherwise than a source of satisfaction to the Society to feel that it has been a means of fostering such talent and bringing it more into public notice.

Amongst the exhibitors this year were found the names of Cole, Collier, Cubley, Curnock, Custard, Davis, Doubling, Eastlake, Ellis, Foot, Fraser, Goddard, Hardy, Hussey, Harlor, Jackson, Johnson, Morrish, Muller, Philp, Poole, Royner, Rosenberg, Salmon, Salter, Smith, Target, Tiffin, Tippet, Toney, Underhill, Whitaker, Widgery, C. Williams, W. Williams, &c.

Lace.—No lace was this year exhibited, as the Arts Committee did not feel it desirable to offer prizes on this occasion for productions in this material.

Venetian Glass.—The revival of the manufacture of Venetian glass having recently taken place by Dr. Salviati, it was deemed desirable to ask him to exhibit some of his productions at Salisbury; to this invitation he kindly responded by forwarding a varied and beautiful collection of examples. It will be remembered that Venice was the first locality in modern Europe where the glass-manufacture was artistically cultivated. The Barberini or Portland vase, still left to us, is an example of what ancient Rome had achieved in glass manufacture; but with the fall of the Roman empire the furnaces of Italy had been extinguished. Some knowledge of the art, however, most probably had been preserved in Constantinople or Damascus, and from thence afterwards conveyed to Venice, which during the eleventh and twelfth centuries stood pre-eminent for her commerce. During the latter period glass manufacture began to be developed, and in a short time the Island of Murano became the great centre of glass-making. This island, in both civil and criminal matters, was wholly governed by the glassmakers, and they protected their art with the most stringent laws. Death was the punishment for a betrayal of the secrets to other nations, while high honours were given to worthy craftsmen. Nobility was frequently granted to them, and their daughters were considered fitting matches for the highest patricians. The art, however, could not, even by such means be preserved for ever to Venice, and in time it fell into decay. For centuries Venetian glass has chiefly been known to collectors of objects of ancient *vertù*, and the prices at which specimens have been sold are almost fabulous. Within the last few years, however, Dr. Salviati, a scientific Venetian gentleman, has relit the ancient furnaces of Murano, and with what success the fine examples exhibited by him at

Salisbury sufficiently attest. In his manufacture he has copied the ancient forms, and to persons unaccustomed to them, and to the general characteristics of Venetian glass, some of his examples might not always appear pleasing. But the fine pure and vitreous character of the material, the wonderful dexterity displayed in the manipulation, and the rich variety and effectiveness of the colouring must have been felt by all. It would be observed that no cut-glass was amongst Dr. Salviati's specimens. By the lovers of Venetian glass, *cutting* is held to be a false and mistaken mode of ornamentation for such a material. The nature of glass itself is ductile and rigid, and to cut it into hard stony, glittering surfaces, is they maintain erroneous. Hence their decorations depend chiefly on flowing lines and beautiful colour, fine examples of which were to be seen in the collection at Salisbury. Here we had the "*filligree*" with "bubbles;" that very curious manufacture of interlacing opaque white threads on a body of clear glass, every diamond interspace containing a tiny airy bubble; the "*ritordi*" or twisted patterns of many colours fused with clear glass curving inwards and outwards to an infinity of forms; the "*Schmelge*" or "mock *agate;*" the "Aventurino of rich golden lustre; the "crackle" or "opal" glass; with various other kinds equally beautiful and remarkable in effect.

The collection sent by Salviati and Co. was very extensive and the rich and varied examples, altogether added greatly to the interest of the Salisbury Exhibition.

Mosaics.—In addition to their collection of glass, Salviati and Co. sent examples of their enamel mosaics, viz,, one of Our Saviour and another of Henry III. These mosaics are chiefly but by no means exclusively intended for the decoration of churches, and are a revival, with some improvements by Dr. Salviati, of the old Venetian enamels. They have already been employed in some buildings of importance in this country, viz in the Royal Chapel, Windsor; St. Paul's Cathedral; the South Kensington Museum, &c. In a climate like ours, so fatal to oil colours and the ordinary frescoes, this mode of colour decoration seems to supply a want, affording as it does brilliant colour and great durability at a moderate cost. The term "mosaic" means a work formed by the use of a number of pieces of some hard material varying in colour, form, and size, which when successfully joined together, give us a whole resembling in character what an artist would produce by his pigments and his brushes. The pieces when properly arranged and fixed in cement, form a solid and uniform body capable of being removed from place to place, and fixed in any manner that may be required. The pieces used by Dr. Salviati are small squa

enamels prepared somewhat in the following manner. On a ground of thick glass is laid a leaf of gold, which is attached principally by the means of fire, then a film of the purest glass is spread over this, and when well manufactured these three layers are so fused together as to become one homogeneous mass. From this it will be readily seen that we get the colour preserved pure, and so protected from all external injury of dust, gas, and smoke, or atmospheric changes, as to render the picture almost indestructible. Hence the extreme value of these decorations in a climate and country like ours, where they are liable to so many sources of injury. We have alluded to these mosaics as chiefly applicable to the decoration of churches, but they admit of a much more extended use. Dr. Salviati considers them applicable to monuments or inscriptions on any walls or ceilings, to the ornamentation of dwelling-houses, public halls, ornamental fountains (even to those parts subject to the play of the water), to theatres, memorial tombs, and also to articles of *bijouterie*, as bracelets, necklaces, broaches, clasps, breast pins, &c. Nor does it appear that these numerous applications of the art of mosaic are merely fanciful; on the contrary, they have been already so applied with success, since Dr. Salviati has obtained several prize medals at different exhibitions for these various novelties. Another fact in connection with these mosaics is that they are not unlikely to give occupation of a refined character to educated persons of either sex, as the squares are sold by Salviati and Co. separately, so as to enable any one who chooses to make the attempt to produce pictures by this method.

South Kensington Museum contributed this year a valuable collection of works of decorative art, in two large cases, under the superintendence of the obliging and intelligent curator, Mr. Worsnop, whose valuable services this society has had frequently before to acknowledge. Among the many objects of interest were a series of carvings in wood and marble, marquetry, goldsmith's work, oriental porcelain, ironwork, and fine examples of ancient Venetian glass, &c.; also collections of reproductions from continental museums, especially from the Louvre and Musée d'Artillerie; Regalia from the Tower of London, &c.

Art Manufacture.—The importance of this section of the department has always been felt by the stewards, since it was to encourage a higher standard of excellence in the various branches of industrial art that it was established; and after the recent reports that have appeared on the Paris Exhibition, the Society cannot but feel satisfied that its efforts have been made for an object that has now become one of really national anxiety. The exhibitors on the present occasion were much the same as those of last year, with some additions. The various

articles now shown were, as a whole, better, and more varie in character than those of last year, evidently showing that mo care and attention had been bestowed in preparing for tl exhibition than on the first occasion. Hence both the articles exh bited and the manner of exhibiting them told with better effe on the eye of the visitor. Amongst the various industries repr sented, were those of cutlery, glass, pottery, furniture, woo carving, jewellery, papier-maché, lamps, and candelabra, grate bookbinding, sewing machines, paper hangings, iron work, & There were also some scientific toys, intended to show son of the less known principles of mechanical action, which we well calculated not only to amuse, but to instruct. The exhibito on this occasion were not only from the immediate neighbourho of Salisbury, but also from distant parts of Devonshire a Somersetshire, and also several from London.

Concluding Remarks.—The recent Paris Exhibition, as alrea noticed, has drawn considerable attention to the state of t industrial arts throughout Europe, and the result has r come out satisfactorily to this country. There may be ma causes for this, but that which appears to have impressed its most upon those whose duty it was more particularly to make an object of attention is, that England wants a better syste of technical education. It should not be forgotten in tl inquiry, that as knowledge becomes more generally diffused, a social institutions become more on the same level throughc different countries, we may expect such countries, both mechanical skill and artistic taste, to approximate nearer to ea other. England holds no patent of superior humanity over l Continental brethren, though she is at times inclined to believe If she has had her Newton, Italy has had her Galileo, Frar her La Place, and Germany her Leibnitz; to which of the science is more particularly indebted it would be difficult to sa while in Art, England must be content to own herself t youngest sister. Her coal fields and her ores led her early i the field of manufacture; but it cannot be anticipated by l most ardent admirers that she must always maintain t superiority gained by her first start. Such expectations must disappointed, and no government interference by the way 'technical education' can ever prevent it. The race for chea ness, too, that has been the great feature in recent trade in tl country, bringing with it 'piece-work,' 'division of labour,' a other short cuts to a desired end, cannot but have acted u favourably on the zeal of the operative, producing carel manipulation, and thoughtless design. But the inferiority English design in manufacture is not any new discovery. It w announced to be the case by Mr. Martin, Mr. Papworth, M

rell, and others in 1836, and then a government school of n was established to correct it, and since that time such ool in one form or other has been in existence. How is it, that after thirty years' experience of such a school, the plaint has only grown louder? Surely this ought to be ence enough that schools for the workmen will not obviate vil. In an article on this department, preceeding the Barn-e exhibition of 1859, the following observations occur: develop properly any branch of trade, there are two parties considered, the producer and the consumer, the seller and buyer. Unless we have a steady demand for an article, we never have a steady supply. Unless we have persons who appreciate improved and beautiful designs when placed re them, and purchase them in preference to inferior ones, shall never get artists fulfilling the conditions we want. education of the producer, therefore, and that of the buyer t go on simultaneously, or works in good taste will not be nanently produced. Our designers will always be in market-art very much what our taste makes them. Decorative art ways in much more danger in this respect than the fine arts. painter and sculptor depend for the sale of their works on educated few,—men who are rich, and purchase individual s at large prices. But designers of manufactured goods luce articles which must be sold by thousands in order to a profit; and if the people do not know good from bad s there is no certainty that any attempts will be made at rovements, since it is better to continue a well-known selling rn than to produce a better whose sale would be uncertain. want in this country has never been of skill to produce, but ste to appreciate what is produced; and the only safe od now to insure improvement in design, is to thoroughly vate the taste of the people. England has never been out eminent artists, and the great designers of all times have the eminent masters, and not persons merely educated for art. Flaxman, Bailey, Stothard, Bell, &c., have all been gners of trade articles; but such men require to be properly mpensed; and where there is no certainty of sale, the manu-rer must speculate the higher by employing such talent, h all safe and careful tradesmen are unwilling to do. A well nised arrangement for bringing before the people at all enient seasons objects of beauty and utility, has become a of national importance; and this society in taking the ative in the matter, has begun a great work, and made ovement which, if successful, will go further." * We still

* 'Journal of Bath and West of England Society,' vol. vii.

believe this to be the true path of progress in manufacturing skil First, to improve the taste of the people, and by such improve taste calling for the best productions to meet it. Hence th society believes that in its Art Department it is working a nation good. It goes annually amongst large classes of people, gen rally far removed from great centres of population, where a extensive museum of objects of art or science exists, bringing f their inspection superior works of both fine and industrial a The unhappy feeling, however, that now exists between capit and labour must, till such can be rectified, have a most pernicio influence on the progress of industrial productions, and it behov all interested in the matter to look well at this retarding cau Whatever may be the operation of the laws in referen to trades' unions, we must find some means of more tru identifying the interests of masters and men, for till we c do this, other means will be inoperative, or, at best, only pall tive. But whatever may be the duty of others in this matt ours is clearly to go on as we have begun, knowing that eve investigation of the subject can only result in confirming t belief that to "extend a demand for works of art and manufa ture, whether useful or ornamental, of the highest quality a best design," is an object of national importance. In this bel the foundations of this department were first laid, and it h ever since been the mainspring of its action.

III.—*The Farming of the Southern Counties.* By ELIAS P. SQUAREY.*

THE object of this paper is to endeavour to give a short sketch the farming of the Southern Counties of England (having espec reference to that of Wilts, Hants, and Dorset), during the p seventy years; to seek to measure the advance, which, un present conditions, may be admitted to be definitely fixed a accepted; to take stock, as it were, of progress during th singularly eventful years.

The almost entire absence of any written sources of inforn on on the subject of this sketch is much to be regretted, and s not until this aid is sought, that the great dearth of anythi ike farming literature becomes apparent. No doubt Arth Young's book, the clear and interesting 'Essay on the Agric re of Wilts' by the late Mr. Davis, of Longleat, the Journ of the Society which now honours this city with its presence, a

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*Paper read at the *Conversazione* given by Dr. Lush, Mayor of Salisbury ne members of the Bath and West of England Society on Wednesday eveni [illegible] 19, 18[illegible] the occasion of the Society's Annual Meeting

other sources of charming and agreeable information are open to us, but for the most part their object is to describe what should be, not what is, and specially we wish to know what *was*, that from a sound datum point, may be measured the advance from that past to this present. The recent valuable Essays in the Journals of the Bath and West of England and the Royal Agricultural Societies, on the farming of the various counties of England, meet this requirement very perfectly for the present time, and yet an agreeable and most useful addition to these essays might be made in the shape of detail histories or descriptions of occasional parishes in each county. There are doubtless many present who would be interested in their various localities to note down the statistics of their parish: into how many occupations it is divided; the general course of cropping; the number and character of cattle, sheep, and horses kept; the rate of wages, &c.: indeed, a minor sort of Doomsday Book. This may be of little present interest, but place such a story in the parish chest, and after the lapse of a century it would, (unless the English mind change its character) be regarded as a treasure. So it is, that which everybody sees, knows, and practices, though in the truest sense history, fails to be remarked or noted as such from its every day presence.

Let me now try to bring before you an outline picture of agriculture towards the end of the last century.

In the counties of Wilts, Hants, and Dorset the farms were held for the most part as copyholds or leaseholds for lives, under the large proprietors. The area of the occupations ranged from 30 to 100 acres, and they remained for generations with singular uniformity in the same family. The renewal for comparatively moderate fines took place at intervals, and the whole burden of erecting and maintaining the dwelling-house and homestead fell with scarcely an exception upon the copyholder or lessee. The cottages of the few labourers employed were generally of similar tenure, having too frequently been built on waste spots for a nominal acknowledgment to the lord. The land was for the most part farmed under the tenantry or common field system, of which a few instances yet remain, a striking example being found in the wonderful Fordington Field, near Dorchester. This tenantry or common field system appears to represent the earliest aggregation of lands for the joint and yet separate use of the tenants of a manor. The entire area of arable land in a manor thus came to be divided according to its character and quality, into the three or four field course of cropping. To each copyholder or freeholder belonged strips of arable and meadow land of various areas, dispersed at irregular intervals over the whole field, so as to secure as far as possible uniformity of quality.

On the arable portion the occupier exercised his discretion sowing wheat, barley, or oats. He took the hay crop, and ther after his lands were fed and folded over by the sheep of tl whole manor, whose numbers were regulated by the old-establish rights attached to each holding. To these common fields we added a large down pasturage, over which the flocks of the man fed during the whole summer. Frequently, too, meadows form part of this system, where each occupier took the fore share, first cut of the grass, whilst the after feed was consumed by t cows, horses, or oxen of the manor.

The roads were, according to tradition, scarcely useable f carriages except in the immediate vicinity of the larger towi To illustrate this, it may be mentioned to those who know t locality, that within the last forty years the roads between t villages of Broadchalke and Ebbesbourne, near this city, were ir passable except by market waggons, and that the whole inte course of that district was carried on on horseback. It m interest some of my younger audience to know that the be which they still occasionally see on the teams of horses we originally adopted for the purpose of giving notice of t approach of a waggon, so as to warn advancing waggoners halt at a spot where a passing might be effected. A story is tc of a carter in this neighbourhood, who, specially proud of a ne set of bells, harnessed his horses before daylight to take a lo of corn to Warminster, and so occupied and charmed was with the sweet music discoursed by the bells, that it was r until dawn, when he had proceeded three miles on his journe that he discovered he had started without the waggon.

The sheep of the period in this district was the Wiltsh Horn, although the Southdowns had just been introduced fashionable novelties. It is a strange but singular illustration the rapid but silent changes which occur in all munda matters, that of the breed of sheep which fed over the wi pastures of this and the adjoining counties not more than sever years ago, there is now not one single specimen left—nay, mo than this, not even a single picture or engraving exists, so far I can ascertain, by which its character and appearance can handed down. Those of my audience who have seen Sir Edw Landseer's picture of the Chillingham cattle in this yea exhibition, will regret that the humbler but scarcely less i teresting sheep of these counties should have failed to secure artist's attention before they became extinct. It must n however, be accepted that these sheep were swept off before t advancing tide of the Southdowns. As in most other cases co promises were effected with the new comers, and some of t best and most highly reputed flocks of the Hampshire and We

Country Downs, now the successors of the Southdowns, doubtless owe a large portion of their size and hardihood to a descent from the old Wiltshire blood. The horned Dorset ewe may be taken as the indigenous but wonderfully improved sheep of that county. Doubtless in some of its characteristics, like the old Wiltshire sheep, it has through the care and skill of its breeders been improved into its present high position. For the soil and climate of its home it is specially adapted, and a nobler or more useful animal can scarcely be found in England.

The cattle, too, have undergone changes very analogous to those described amongst sheep. The Long Horn was the dairy cow of the district. This breed is still to be met with in isolated cases in the southern counties, and when the fine character and quality of good specimens of this breed are considered, one is almost tempted to regret that an imperfect adaptation of the Shorthorn, and other mixed breeds, should so nearly have superseded it.

The character of labour and its remuneration are singularly interesting, because at a period not long preceding that which I am attempting to describe, the line between the copyholder or leaseholder and the labourer was very faintly marked, and the character of the holdings was such as to enable a thrifty labourer to emerge from his condition into the small farmer. At this period it was the custom to board and lodge the younger men who were employed on the farm; and at certain times, such as harvest, haymaking, shearing, the whole body of labourers were fed by the farmer. But the altered condition of the farmer and his family has tended to a complete abolition of this practice, but not possibly without some loss of the good feeling which traditionally is stated to have existed between the master and his men. It is not for us to discuss the policy or otherwise which reduced a class so valuable as these yeomen to a *quasi* servile condition: however much we may regret this consequence, and sympathise with those affected, I cannot but believe that a largely increased power to produce food for the whole population was developed by the circumstances which I shall attempt to describe. It was the painful but inevitable conclusion of a condition of things right enough, it may be, for those or a few preceding centuries, but inapplicable to the wants of an increasing or wealthier population. The transition state was one of acute suffering to the dispossessed yeoman and labourer, and the agricultural annals of the period are full of schemes for the relief of the distress which prevailed amongst the labourers of the agricultural districts—its prevention by emigration, or application to new sources of industry. The wages were largely subsidised by supplies of corn and other necessaries, at prices

generally below the market value. An examination of t available sources of information leads to the belief that duri the first increase in prices of corn and meat, incident to the w which terminated by the peace of Amiens, the condition of t labourer was worse than at any other period of our history, a from its very desperation arose the system of parish relief, whi until the recent just and sound legislation, contributed much the demoralised and dependent condition of the present fa labourer.

The implements of this period were simple in the extren and had but little advanced during the preceding century. T plough with two wheels (to which principle, after a multitude trials and failures, we have now returned) the drag, harrows, a a nine-share plough constituted the means by which tillage w as perfectly, though possibly not so rapidly, achieved by a go farmer as it is now. Waggons and carts were built more heav than at present, and the use of iron for axles was quite unknow

But I have yet to touch upon the great feature which revol tionised the farming of this country. I refer to the system enclosure, and the consequent abolition of the common fie system which has been previously described at length. reference to the journals of your Society and other sources in cates that a few parishes only were enclosed prior to 1780. would seem that about that period the advantages of enclosur the greater economy of management, the increased quantity stock which might be kept, and the individual benefit resulti to the farmer from improvements which he personally effect were fully recognised, and, stimulated by the increasing pri of corn, they were pushed on with great energy. Up to 18 the number of enclosures were—in Hampshire, 21; Dorset, 1 and Wilts, 85; and it is probable that a large number of parisl were enclosed by agreement, of which no record is kept. T change in the character and position of the occupier is indicat by the fact that the rentals of farms after enclosures had tak place ranged generally from 100*l.* to 400*l.* per annum, whi the rental of the lands held in tenantry varied from 15*l.* to 4 per annum. It is obvious from this that a wealthier class w found to rent the enclosed lands, and it is equally obvious, has been suggested, that the dispossessed and small occup sank generally to the condition of the labourer instead of migrati to other districts to farm, or otherwise apply his powers. Duri this period and the subsequent twenty-five years the continu high prices of grain stimulated the conversion of the do pasture into arable land. In many cases this was most judicio and profitable alike to the farmer and the nation, but often t selection of land for this purpose was indiscriminate and unwi

terrible reaction followed, for much of this type of land, which · years remained uncultivated, until the introduction of bone st, guano, artificial manures, and the like, at length awakened faith (justified by practice) that these previously ill-treated d starved lands might be usefully cultivated.

Of the produce per acre of the corn crops of this period, and antity of stock kept, there is no reliable information whatever. ıt the experience of those with whom I have conversed on ɜse subjects leads to the belief that the yield per acre on the linary soils has increased very considerably, while the greater ɔduction of corn and its consequently decreased price has ıulted in an equal extent from the larger area under cultivation. n one point, however, there is little doubt, that on the stronger ıeat lands which underlie the chalk, the mode of cultivation r the staple commodity, wheat, was as perfect sixty years ago at the present time, and consequently the yield from these lands as probably equally large. It must, however, be borne in mind ıat the produce from this type of land in mutton, wool, and ɜef has enormously increased, for at the date referred to the 'stem of growing artificial food for stock was scarcely practised.

Let us now glance at what has been the progress out of the ıass of theories, inventions, systems, successes and failures which, ıore or less occupying men's minds, have endured or disppeared according to the good that was in them. By progress meant those practices, those implements, and those breeds of ıttle, which, without claiming for them finality, are yet intiıately and inseparably welded into and bound up with the resent modes of farming. During the interval which it has een attempted to bridge over, the most marked feature appears be the enormously increased production of stock, and this ıcrease is not only numerical, but in an equal if not larger proɔrtion it consists in the improved quality and early maturity of ıe individual animal. Many of my audience can measure the ide difference in the size and quality of the lambs brought to ritford and Wilton fairs thirty years ago, with those which now ·cupy their places. The far-seeing ability of a comparatively w men, whose names will at once occur to the flockmasters of ese counties, has conduced to this national benefit.

Consequent upon the larger numbers and improved condition sheep is the increased production of grain; no means are ıen of measuring what such increase really has been, but in the llective form of larger produce and wider area it may be estiated probably at something like 40 to 45 per cent. during the ıt sixty years.

The application of machinery to farming operations during is period has been singularly extensive and useful. At about

the commencement of the century a Scotch mechanic wa: struggling to develop the thrashing machine, and it is marvellou: to think that only thirty-five years ago this neighbourhood wa: disquieted by riots arising from the introduction of these imple ments. What an interval of time, human thought, and inventio lies between cattle treading the corn from the outspread sheave in the far-off Palestine, and the locomotive engine one now meet dragging its own complicated but effective thrashing and win nowing machinery to the next homestead! Nor is this the onl application of that giant power in the service of agricultur After years of laborious thought and careful trials, and a immense expenditure of money, as yet pecuniarily unrewarde Fowler, Smith, Howard, and other patient inventors hav brought into the domain of practice and fact the dreams thoughtful men—steam cultivation. Perhaps in no district ha it been as yet more widely applied than in Wilts, for on th estate of one nobleman only, no less than nine steam ploughin or cultivating apparatus are in work. Those who have use them constantly concur in one most valuable result, viz., th whatever doubt may exist in the economy of these operations compared with horse power, there is no doubt of the superi excellence of their work. Every reflective man must see in the application another source of extended production for an i creasing people.

The legislation of the past sixty years affecting agricultur matters has been of an exciting character. During that tin arose, flourished, and fell the system of protection to agricultur More silently, but provoking grave discussion amongst tho interested, was introduced and passed the Tithe Commutati Act, which more largely conduced to the increased productio of England than any previous legislation, except possibly t Enclosure Acts. Lastly came the gradual enfranchisement agricultural labour by the modifications of the law of settleme which as a measure at once of justice and policy, may be e pected greatly to benefit the labourer himself, whilst its operati will undoubtedly contribute to the development of superior a more skilled labour for the farmer.

A long postponed but certain result of the enclosure syste has been the erection of homesteads and residences adapted f the enlarged character of the farm and for their comparative concentrated arrangement. A similar action has also operat on the wretched cottages which had grown up under the syste before referred to, and of which too many yet remain. Looki round this neighbourhood and seeing the immense improveme effected in these directions on various estates, it is interesting look that large [illegible] the outlay has been. It is fully represent

in the annual improved value of the farms, in the high character of the tenantry, and their liberal management of the land, and lastly, by the increased comfort and happiness which it has brought home to the labourer.

Of the great questions affecting the present, and to a possibly larger extent the future of farming, the supply of manual labour is almost paramount. The action of laws interfering with the natural and healthy distribution of labour in the earlier period under consideration, aggravated by other causes before referred to, tended to reduce the remuneration for farm labour to its lowest known point in these southern and western counties. This excessive supply of labour resulted in an uniformity of wages, in which the value and capacity of the most unskilled and inferior servant was too often the measure of payment to the best. The stimulants to energy, industry, and skill were thus neutralised: in too many cases a dead level of incapacity resulted. But in the tide of advancing wages for labour of whatever character, no exception will be found in the future remuneration of the farm labourer. Such advance will probably be less abrupt than in other types of wages, because a good cottage and garden in the sweet country air, with sufficient plain food and no excessive exertion is more attractive than iron puddling or cotton spinning, though the money wages may be double or treble in the latter cases. The influence of mother earth seems to operate alike on landlord, tenant, and labourer. They each love what has been their home—the field, the meadow, the breezy down over which they have sported or worked—and this insensible but strong influence is not to be omitted in considering the causes which in the past have governed, and in the future will govern yet further, the question of wages.

The capital required for farming in those days is in great contrast to the requirements of the present. Considering the value and number of stock of all descriptions at that time, the mode of entry on, and the management of farms, I am disposed to think that the capital now invested in farming (partly due, of course, to the larger area under cultivation) is probably doubled.

Let me conclude this outline sketch of a grand subject with a regret that its treatment has fallen into such incompetent hands. I feel that if this paper has failed to interest you, that it is due to the incomplete manner in which it is put before you, rather than from any lack of importance or charm attaching to the subject itself.

IV.—*Agricultural Experience of Town Sewage in* 1867. By J. CHALMERS MORTON.

THE current number of the English Agricultural Society Journal (No. 6, second series), contains an elaborate analys and report of the various attempts which have been made (*a*) to *estimate* and (*b*) to *realise* the value of town sewage as manure. The information thus collected has indeed, the auth tells us, been gathered chiefly from the already published pape of Messrs. Lawes and Gilbert; but the substance of the publications seems to be so fairly given in this epitome of the that the leading facts under both of these divisions of the subje may be safely quoted from it. And they may be stated thus:-

(*a*) The results of many analyses by our leading chemist whether of the food of a mixed population, or of the resulta sewage of a town supplied with water-closets and well draine teach that nitrogen equal to 200 ounces of ammonia is void annually in the urine and fæces of every individual: a quanti which, when the waste water of a town amounts to 40, 60, 8 or 100 tons per head per annum, will represent 9·771, 6·51, 4·8 and 3·91 grains in each gallon of the sewage respectively. A this represents a composition which, so far as this one ite (ammonia) is concerned, makes 1000 tons of such sewage equ in agricultural value to $16\frac{2}{5}$, 11, $8\frac{1}{5}$, and $6\frac{4}{5}$ cwts. of gua respectively. Guano is sold at 13*s.* a cwt., or thereabouts, a thus the estimated value of the sewage of these several strengt is 2·44*d.*, 1·67*d.*, 1·25*d.*, and one penny per ton respectively: eve grain of ammonia in a gallon of sewage giving about one farthi per ton of the same liquid on this valuation by comparison wi guano—a fact which has the advantage of being easily reme bered. Perhaps the ammoniacal strength which best represe the average quality of sewage where storm waters have n access to the drains, is that one which corresponds to nearly tons to every individual of a population, or about 7 grains p gallon, which is 1 in every 10,000 parts; and this, too, is ea be remembered.

An interesting table is given showing the relationship of t ammonia (or nitrogen) to the several mineral ingredients in t cases both of sewage and of a number of specified agricultu crops. It states that in the Rugby sewage there are 27 parts phosphoric acid and 42 of potash, to every 100 parts of nitroge ordinary grass the proportions are 27 and 100, respectively, every 100 parts of nitrogen; in clover, 23 and 52; in whe the whole ripe plant [illegible] and 57 [illegible] wheat (grain alone, whi [illegible] the whc

plant, 30 and 50; in beans alone, 25 and 32; in Swedish ps, 21 and 63. It thus appears that so far as its phosphoric and ammonia are concerned, town sewage is a "well conned" food for most of these crops. And the occasional ication to the land of some of those cheap German potash which Dr. Voelcker has made known, seems all that is sary to hinder the excessive growth of plants (which it sions) from exhausting the natural supply of potash in the and from thus acting, as every lop-sided fertiliser does, robber of those ingredients of soils in which it is itself ient. But there are several reasons why we cannot admit even such a limited disparagement of sewage, as a complete ire, as this amounts to necessarily follows from the facts. in the first place, the quantity of any ingredient present at ime in any plant is no guide to the quantity which that may have needed during the processes of growth; and , as it is certainly in the alkaline ingredients of the sewage town that any speciality of composition will most commonly ar, (for they are derived from the wear of its streets as as from the waste of its households,) so it is quite possible he sewage of Rugby, which alone is specified in this table, not be such as to justify the erection of any general rule it; and lastly, the quantity of sewage applied to land l to from 6 to 16 cwts. of guano for every 1000 tons) is so that any ingredient, though present in small *proportion* must plied in enormous *quantity*, and far beyond the requirements y of the crops named in the table.

ese, then, are the leading points to which the attempts to *ite* the value of the sewage of a town have led:—Two red ounces of ammonia per annum pass through the water- from every individual of a population—equal to one part monia in every 10,000 parts of the drainage water of our —the actual quantity varying with the water supply so as to make 1000 tons of it worth as much as from 6 to ts. of guano, or from 1*d.* to 2½*d.* per ton—the proportions of er ingredients (potash and phosphoric acid) corresponding with that of its ammonia, or nitrogen, to the wants of of our cultivated crops; that of potash, however, being ally deficient.

But what has experience taught us hitherto through the pts which have been made to realise these estimates? A bly explicit answer is given to this question in the paper us. We have the results of the experiments performed the direction of the Royal Commissioners at Rugby, the al results there since, and the general results at Edinburgh, lon, Carlisle, Watford, Worthing, and elsewhere. Of these

the Rugby results are the most exact, and those at Edinburgh and Croydon are the most encouraging. The results at Rugby may be stated thus:—On rich adhesive soil in grass (old pasture), and on comparatively poorer and more open soil (partly in old grass, and partly in Italian rye-grass), while 15*l.* worth of milk (exclusive of the cost of oilcake) was got per acre in one season from cows fed on the unsewaged natural grass, no less than 25*l.* 7*s.* worth, 33*l.* 6*s.* 10*d.* worth, and 36*l.* 1*s.* 4*d.* worth of milk were obtained from the same extent of land which had been watered with 3000, 6000, and 9000 tons of sewage per acre respectively. The milk was valued at 1*d.* per pint; and thus from 3*l.*, in the case of the largest dressing, to 4*l.* 2*s.* 3*d.* and 4*l.* 10*s.* 7*d.*, worth of milk, beyond the natural and unassisted quantity, was obtained from the use of every 1000 tons of sewage; or an average of ·931 of a penny per ton. This sewage, moreover, had not been thoroughly exhausted. I have seen it running foul and discoloured off the land at Rugby; and on analysis it has been found to contain still 1 or 2 grains out of its original 6 or 8 grains of ammonia per gallon, justifying an addition to the returns of 1 or 2 farthings per ton for value remaining unexhausted, which might have been extracted had it been used a second time. It is only fair to add regarding Rugby, that notwithstanding the facts thus given, none of the tenants of the land over which the sewage flows are very sanguine of the profit or advantage of incurring the cost of steam power for raising it for use in ordinary irrigation, and "the application by means of steam-power, pipes, hose, and jet will probably soon be entirely abandoned." I understand, however, that some of the difficulty of making its use more profitable here arises from inconvenient arrangements between joint tenants, permitting neither of them to gain the full advantage of its use. Meanwhile it is believed, on the ground of the experience here, that "with 5000 tons of sewage judiciously applied to one acre of Italian rye-grass and meadow land properly laid down to receive it, an average of 1000 gallons of milk per annum may be anticipated, which at 8*d.* per gallon, would represent a gross money return of 33*l.* 6*s.* 8*d.*"

The general result of sewage experience at Edinburgh and at Croydon may be stated as follows:—Over between 300 and 400 acres of grass land (chiefly permanent and perennial grass), on all sides of Edinburgh, a quantity not generally exceeding 20,000 tons of foul water per acre per annum, including the drainage of a large part of the city, is poured as in water-meadows, and 4 or 5 crops of grass are cut in the year. The produce between April and November is annually let or sold (to purchasers who cut and carry it themselves) for prices which

verage at least 25*l.*, and in many cases exceed 40*l.* per imperial cre.

On the shore between Leith and Portobello a slope of sheer ea-sand is thus fertilised: and the grass produce, averaging 4 or cuttings in the year, is sold by auction, generally for over 30*l.* n acre. The highest prices of the whole area have been obained from this, which is naturally the poorest soil; and the whole of this fertility is due to the waters of the Foul Burn, as it is called, which, having been already used over land higher up the valley, are applied in diminished strength to the lands below.

No doubt, when 25*l.* or 30*l.* is put against the 20,000 tons of sewage which produce it there appears but a small return per ton,—much smaller than even the Rugby experiments gave, and this was very much below the estimate founded on the composition of the water. But on the other hand, it must be remembered that the Foul Burn is not the mere drainage-water of the town, but the natural outfall of a large area of open country as well; including, therefore, much mere land and rain water. And again, there cannot be a doubt that a very large proportion of the fertilising matters which it brings with it is carried out to sea. I have seen it running into the tide close by the town of Leith, almost as filthy-looking as when it came upon the land much higher up the valley. And I believe, therefore, it is right to speak of the Edinburgh experience, now of many years standing, even though but a small value is there realised per ton from the sewage used, as by far the most encouraging piece of sewage agriculture that has been yet recorded.

At Croydon, where a seven years' lease of land over which the sewage has been pouring, under the direction of the tenant, is just expiring—and where they say a much higher rent will be easily obtained for the next term of years—the facts of the case cannot, of course, be so confidently given as at Edinburgh, where every one can read them in the annual price-lists of an open sale by auction; "but it is estimated here that, after making the deduction of 4*l.* rental, the *gross* returns from the sewage applied is, at the present prices of the produce, with Italian rye-grass from ¾*d.* to 1*d.*, and with meadow-grass from ½*d.* to ¾*d.* [per ton]. The sewage is not applied in any systematic manner to other crops, but it has been applied on a small scale to root-crops. An enlargement of the area of irrigation is contemplated, which will, if carried out, somewhat reduce the amount of fluid and excretal matters available per acre."

The other instances of actual experience given in the paper from which the above are quoted are not sufficiently definite, or, I may add, sufficiently well established, to be of much use towards the formation of a fair opinion on the subject; but I believe

we may conclude, from the facts already stated, that by the practically unlimited use of *foul water* as at Edinburgh, water-meadow fashion, over the poorest land, we may, near large towns where there is a great demand for milk, obtain an almost net return of 20*l.* to 30*l.* worth of grass per acre—that being the value per acre of the produce annually sold to purchasers who cut and carry it themselves; and that by applying 5000 tons of *true sewage* per acre to good grass-land similarly situated we may, as at Rugby, increase the annual value of its produce from 15*l.* (its natural amount) up to 30*l.* or more per acre; thus realising nearly 4*l.* per 1000 tons of the water used, which is nearly 1*d.* per ton. Even this, however, which is the largest amount yet quotable from experience, is far below the chemist's estimate of value. And I am bound to add that the difference between the value estimated even on unquestionable data (which are used, too, as the basis of what appears to be a fair and reasonable calculation) and the value actually realised from any agricultural use of sewage which has hitherto been quoted, imperfect though the methods used have been, is greater than has been yet accounted for. There seems in the excessive dilution suffered by the fertilising matters even of the strongest sewage, to be some hitherto unexplained hindrance to the fertilising action which, as for example, in our guanos and superphosphates, they elsewhere exert. At any rate, the quantities of them present in the foul waters of our towns have nowhere yet produced the same fertilising effects which similar quantities of the same materials produce when applied in the solid form. And the explanation is not rendered any the easier by the fact, now well known to farmers, that the serviceableness of any artificial manure depends very materially upon the means taken to distribute it evenly throughout the soil; so that guano, well powdered and mixed with eight or ten times its weight of soil before application, or guano well mixed with water and distributed through the water-drill, is more efficient as a manure than guano applied by hand along the drills without any special care to divide and distribute it. Nor does another fact, to which the past year's experience at Lodge Farm, Barking, bears ample testimony, at all contribute to the solution of the difficulty,—that there is evidently greater waste when the sewage comes of unusual strength upon the land than when it comes so weak as at once to lose its [illegible] when poured over the surface of [illegible]

[illegible] statement has been intended as a report [illegible] ultural [illegible] of town sewage so far as that had

ı determined up till the date of the latest publications on the ject; and it has been obtained, as I have said, principally n the article in the current number of the English Agricul- ıl Society's Journal.

have now to describe the experience of its value during the t year upon the Lodge Farm, near Barking, where it has n poured, more or less continuously, since October, 1866, r an area at length amounting to 55 acres, or about one- arter of the extent of the farm. And I will preface this part my paper with a further reference to the point just alluded to, ., the imperfect realisation in agricultural experience of the emist's estimate of value. All, of course, that the chemist es is to tell us that there are in a ton of ordinary sewage many ounces of ammonia, phosphorus, and potash,—sub- nces which have a certain market value per lb., a value at ich in guanos, superphosphates, and other fertilisers, farmers generally glad to buy them. But it must be remembered t it is only under certain circumstances that it answers the rpose of the farmer to buy guano or superphosphate and apply o his crops; and twenty years or more having elapsed since ano and superphosphate have come into general agricultural , these circumstances are now perfectly well understood. It nly to certain crops, in certain quantities, to certain soils, and certain times of the year, that guano can be profitably applied. given to the land in excessive quantities, at the wrong time, to the wrong crops, it will not reproduce the 13*s.* given for ry cwt. of it,—the price at which, on the chemist's valuation, was bought. Sixpence worth of the nitrogen or ammonia, ether of guano or of sewage, or of the phosphorus, whether of ne-dust or of sewage, will not necessarily create sixpence worth additional fertility by its use in agriculture. It may do this more in skilful hands, but it is quite as possible that it may thrown absolutely to waste or even made mischievous and urious.

A plant is a living thing, which must be kept in health by other ıditions, as well as by the mere presence in fitting forms of material it feeds upon, or it will not produce a crop at all; and lo not think that this is sufficiently borne in mind by enthusi- ic believers in the value of town sewage. They seem to think ıt the twopence worth of fertilising matters which may be in on of it must reappear in the form of at least twopence worth litional of the crop to which it is anyhow, or anywhere, or *when* applied. Whereas it is plain that it is upon the how, where, and the when that the advantage or the profit of s or any other dressing of manure depends.

And great as have been the results of the application of

sewage upon Lodge Farm during the past year, it is, I beli in the certainty that they might have been much greater u better management, in the lessons which have been learnt our future guidance, in the blunders and the losses by whic have been taught something of the how, and when, and whe future sewage applications that the chief value of the y experience lies.

Some time in December, 1865, I was requested by the D tors of the Metropolis Sewage Company to report whether farm were a suitable place on which to exhibit the value of sev as a manure. It lies less than 2 miles from the outfal Barking, where the whole of the North London drainag present runs into the Thames; and it was proposed to lay a of 15-inch iron pipes across the marsh land lying between two, and pump through them from this outfall on to the lan

I found that part of it nearest to the outfall to be gene a thin and open soil upon a gravelly subsoil, most of it lyin either gentle or considerable slopes, which would facilitate distribution of the water. Extending over about 200 a mostly arable, at least one-half of it was commanded by that where it was proposed that the iron pipage should terminat that a reception tank being erected there, the water would from it along surface-ditches, and out of them into carriers, e the ridge lines of artificial lands made as in an ordinary and furrow water-meadow, or the contour lines (where the s was great enough) of a so-called catch-water meadow; th trickling over the surface of the pane of land immedi below each, and feeding whatever plants might be gro on it.

The slopes being just what were most desirable, and the being open enough to deal with a quantity of water which m be triple or quadruple the ordinary rainfall of the place, commended that the farm should be taken notwithstanding the situation was more secluded and retired than was desi for a great public experiment; and in the spring of 1866 general management of the farm was placed in my hands.

It is only in reference to the application of the sewage that management need be described. The surface-distribution o water, as in an irrigated meadow, was of course resolved up he only method cheap enough to deal, without excessive with the large quantity to be applied. But before the detai distribution were arranged, two things were resolved upo necessary preliminaries: and in both of these it is probable necessary expense was incurred. Influenced by the effe sewage upon the Rugby pastures, I advised the construc settling tank made large enough to ensure a comparati

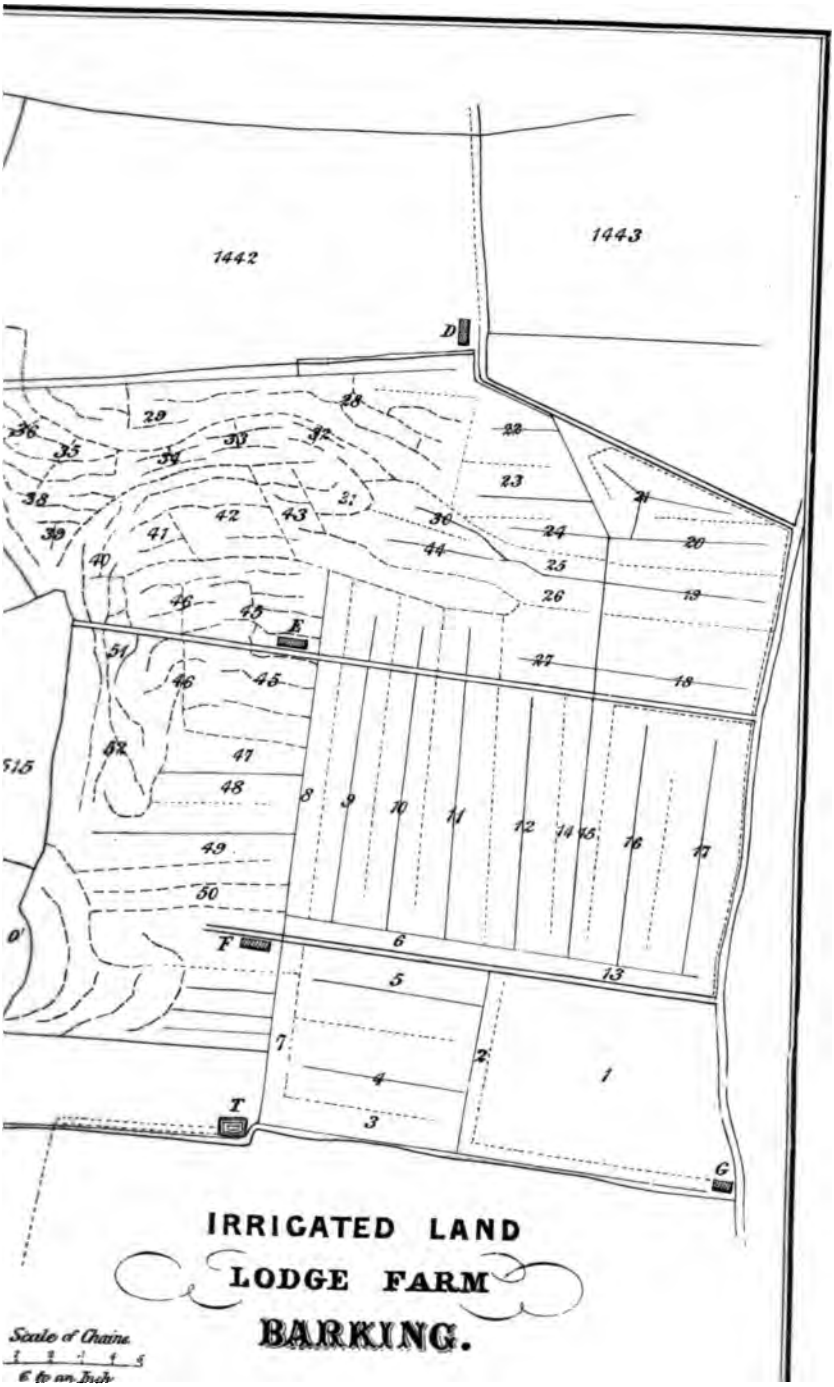
slow flow of the water over the edges of it, so that any coarse sediment might remain behind. At Rugby, patches of good grass had evidently been killed by sediment left wherever any unequal flow of sewage occurred upon the surface of the land, and in these blank places coarse weeds had at length sprung up to the subsequent injury of the pasture. In order to avoid this risk it seemed advisable to catch and remove as much of the mere sedimentary mud of the sewage as possible before it entered the carriers to the land. This would no doubt have been a necessary proceeding had it been old grass land that was to be irrigated; but on arable land, where Italian ryegrass is the only grass crop taken, and (being a biennial plant) it is necessarily ploughed up every second or third year, the evil which arose in the course of years at Rugby has hardly time to grow; and though this settling tank has been of some service in holding back both mud and paper, which is best kept off even merely annual and biennial grass, yet in our case it was hardly necessary, and the expense of it accordingly might have been avoided.

Acting again on the impression which ordinary agricultural experience justifies, that a soil free enough, and a subsoil open enough, to deal with the water of an ordinary Essex rainfall, might not be sufficient for the drainage of the land when that rainfall should, by the addition of so much water, be virtually tripled or quadrupled, it was resolved that the whole area of the experiment should be adequately drained. Two 7 or 8-feet deep drains, carrying 7-inch drainage pipes,* were accordingly cut up the two valley-like depressions in the land, about 400 yards from one another, and nearly parallel; and the interval between them was crossed by four parallel drains running into them about 80 yards apart, 6 or 7 feet deep, and carrying 4-inch pipes. Both of the main drains have generally been in active operation; the one down the valley, on the northern side of the farm, was necessary to the proper condition of the land and of the farm premises from which it leads; the other has been advantageous; but the cross drains between the two have been I think unnecessary. The gravel is so free and deep that no help of the kind offered by these drains was needed. And on the other hand, the sinking of the earth in these deep cuttings, which has continued more or less under the influence of irrigation all through the past summer, has been a great surface difficulty in the way of the even distribution of the water.

After this drainage (much of it unnecessary) had been completed the work of laying out the land for irrigation was

* These main drains empty at O and O′ on the map—the line of the former passing through the figures 39, 34, 33, 32, and between 22 and 23, up to the homestead, which is placed near that part of the farm; and that of the latter up to figure 5, and afterwards along the middle of the roadway there marked on the map.

proceeded with. The natural slopes of the surface became our guide to the direction in which the carriers should be made which were to take the sewage from the tank (T on the map) all over the area to be irrigated. Mr. Cyrus Combes, of Tisbury, long accustomed to the laying out of water-meadows, had just completed this work upon a 9-acre plot of land near the outfall at Barking Creek, and I was glad to have the assistance not only of his staff of skilled labourers, but of his own experience and good judgment in such work. The mode in which the land was at length laid out is indicated in the map. The plot marked No. 1 upon the map, nearly 5 acres in extent, is so flat that it was resolved to attempt the plan of distribution there from the "carrier" alongside of it by moveable troughs, as is done on the Carlisle meadows. Over the whole of the remainder of the land the water would flow naturally; but the slope over the space occupied by plots 2 to 28 being supposed too slight for catch-water irrigation, the whole of that space was laid out on the ridge and furrow plan, while the carriers over the remainder of the area where the slope was greater were laid out in contour lines crossed at intervals with feeders, as in catch-water irrigation. The accompanying map shows the position of the carriers and drains where the ridge and furrow plan of irrigation was adopted; and it also shows the position of those carriers which are also drains, where the catch-water system has been adopted. The unbroken lines are carriers placed on the ridge lines of the irrigated "lands;" the *dotted* lines are drains placed in the furrows between the irrigated "lands;" and the *broken* lines are those furrows used in catch-water irrigation, which are carriers for the panes below them, and drains for the panes above them. Most of the beds where the ridge and furrow plan has been followed are 50 or 60 yards wide and 6 to 8 inches high, the "pane" on either side being 80 feet or thereabouts in width, and the fall 1 in 120 or 140, which has proved quite sufficient. A good deal of the work of forming the beds was done by horse power. The lands were first staked out, and then the common plough was used to cross the whole set of ridges (for example, Nos. 8 to 17), beginning at the upper end of the field—returning one way always empty so as to throw the furrow one way only. A subsoiler followed in the wake of the plough; and a gang of men, 4 or 5 on every bed, were at work with spade and barrow, wheeling 4 inches depth of the moved subsoil in the lines of the surface-drains, and filling up with it the furrow near the lines of the ridges and carriers, and dealing with the subsoil throughout the furrow by addition or subtraction according to its position on the ridge, completing the work by the time the plough came round again, so that the 6 or 8 inches of top-soil which were thrown by it over the subsoil surface of the


1442
1443
D
E
F
T
G
IRRIGATED LAND
LODGE FARM
BARKING.
Scale of Chains
6 to an Inch

ıw thus prepared should result in the formation of the "land" ı the necessary slope. And in this way the whole series of nds" was formed as the work proceeded.

ı subsequent "sizing," as it is called, was needed to make whole surface uniformly sloping; and the earth taken in ning the carriers along the ridge lines of these lands, and the ins along the furrows between them, was generally sufficient orrect any unevenness that the plough thus helped had left. ; carriers are ditches of considerable size, about 18 inches by inches in section, in order to render the flow of water in them mpeded. The intervening drains or furrows are not made p, for it is not desirable that the water should flow easily ıy. Stops indeed are left where the slope is rapid, to check ıpid run. The edges of the carriers down the ridge lines he beds 8 to 17 are levelled in steps, so that, when once the l is covered with grass, each horizontal step in its length may watered at one time. The water fills up to the edge and then kles evenly over it throughout the length of that particular tion of its length, from which it is at length stopped absolutely a spade; and the section next above it is then treated in like nner until the water has fully sodden and covered the whole l lying between it and the drains; and a third section of the gth then takes its turn.

As soon as Mr. Combes and his men had completed the work 'sizing," and the carriers had been properly formed, the cul-tor was put through the lands lengthwise, followed by the row and roller, and four bushels of Italian ryegrass were sown, shed in, and rolled down. Plots 3 and 7 had been drilled ı lucerne in the month of May; plot 5 was sown with Italian rass in June; No. 4 was sown with Schraeder's Bromus, a s strongly recommended for the purpose by its introducers; . 6, 8, 9, and 10 to 17, were sown in July; 18 and 19 were n in August; plots 20 and 21, 26 and 27, were sown late September; and all the rest, up to No. 52, omitting 49 and were sown in October (1866), after the land had been pro-y contoured with carriers, and cut across with feeders and ed."

'he piping and pumping apparatus not having been completed, sewage did not pour into the tank before October, and before ı all the land up to plot 18 was covered with a crop, not only rass, some of it already throwing up seed-stems, but of chick-d and groundsel, which nearly overtopped it and seemed ready mother it. Attempts were made to top over the groundsel ı the scythe so as to hinder it from seeding; and boys and nen were employed to pull thistles and other large weeds; and ength it became necessary to cut the whole crop and make it hay. The season was extremely wet, and the late hay-

making was thus very difficult, and over some of the land impossible; but it was ultimately all carried off the land, and we were at length able to let the sewage down the carriers and over the surface of the ridges. It was delivered by the pump at the rate of about 300 tons an hour (wooden boxes capable of holding 10 tons each had been erected above the tank for the purpose of ascertaining accurately what the quantity delivered really was); and, going over one ridge after another in the manner already described, we were able to get over four or five acres a day so as give the land a dressing of 500 or 600 tons per acre. I may mention, lest a first experience elsewhere should be discouraging, that we were then met by another set of difficulties. Wherever hollows in the original surface had been covered by artificial filling up, the moved earth sank ("pitched" is the technical term) as soon as the water reached it; and the lines of the drains (though the earth had been rammed in when filling them) also sank so as to form surface-ditches, which interfered with the distribution of the surface-water, causing it to pond here, and to run by there, and thus to create extraordinary growth in one place while another was comparatively starved; but the correction of these defects was gradually accomplished, and the patchy appearance of the grass altogether disappeared with the first cutting after sewage.

I mention all these difficulties threatened by weeds and created by faults in the "sizing" of the beds and in the levelling of the carriers, because the year's experience proves, I think, that a good deal of unnecessary expense was incurred in the labour of artificially correcting them. The grass sown upon land ploughed out of wheat-stubble, or formerly in potatoes, turnips, cabbage, &c., had come up as foul as it could be, fairly overtopped, as I have said, with groundsel, full of chickweed, and mayweed; and filled over whole acres with, what I had never before seen, an evenly distributed seedling plant of deadly nightshade; and here and there large patches of docks and thistles. The sewage had been promised in July, and had it been known that it would not come till late in the autumn I would not have sown the grass so soon, but would have allowed a crop or two of these seedling-weeds to sprout in the first place in order to destroy them. But, after all, there was no need of any anxiety; none of them appeared again after the first crop of sewaged grass had been obtained. To all appearance there was nothing then upon or in the land but a perfectly even well-rooted vigorous plant of Italian ryegrass, whose supremacy in its vigorous growth under sewage-irrigation was very soon established, and everything else was smothered and destroyed. Certainly a young Italian ryegrass plant and a liberal allowance of town sewage are together a wonderful agency for the production of vigorous vegetable growth. After eighteen

ıonths, however, or even twelve, the vigour of the plant dimi-
.ishes. If allowed to seed, it dies; and even the partial forma-
ion of the seed-stem appears to have a weakening effect; for
.fter the young spike has been allowed to appear during three or
our successive cuttings, the plant gradually dies out of the land,
ınd other plants, generally Poas and other grasses, begin to show
hemselves, and it becomes necessary to plough the land up and
:ither sow down again or take a fallow crop of some kind before
ınother coating of Italian ryegrass can be had in its strength.

I may mention here that when the land, in a very foul and
ımpoverished condition, was placed in my charge, I proposed to
›btain a plant, for the proper illustration of the fertilising effects
›f sewage, in the ordinary agricultural manner. The soil was
poor and must be enriched either by the direct addition of manure
›r by folding well-fed sheep upon it, thereby getting a good seed-
bed for the Italian ryegrass, which would come up strong, and
ıble, when fed with sewage, to do full justice to its wonderful
fertilising power. But this plan was overruled. The directors
of the Company judged that it was better that whatever result
might be obtained should be attributable to the sewage only. The
young crop was, however, thus less fitted than it might have been to
contend with its weed enemies; and notwithstanding its com-
plete victory over these, when once the sewage-water had been
applied, I believe that it will always be the interest of any tenant
of land for irrigation in this way, to provide the best possible
preparation of the crop that is to be sewaged that he can give it.

One word more about the other plants that were being sewaged
at intervals during November and December, 1866. The plots
3 and 7, sown with lucerne, came up regularly and well; but it
was on impoverished soil, much of it *made* land; for the carrier
along the side of No. 7 had to be raised so as to command the
upper end of plots 8 to 17. The crop upon them dwindled and
died down in patches before the sewage reached it, and ulti-
mately they were ploughed up. One of them was then planted
with so-called "bunching cabbages," which prospered exceed-
ingly and were sold upon the land as greens at the rate of 10*l.* an
acre in the autumn of 1867; the other (No. 3) was sown with
Italian ryegrass in the spring of 1867, and has yielded enormous
crops during the past season.

The plot of Bromus, again, not having come up satisfactorily,
was resown over the blanks; but even in the best places the
crop was most unsatisfactory. It threw up its seed-stems imme-
diately; and both leaf and stem were the roughest, harshest, grass
imaginable, unwillingly taken by the cows to which it was given;
nor was the quantity of its yield nearly so abundant as that of the
ryegrass alongside; and at length in August, 1867, it was ploughed

up and planted with cabbages, 15 inches apart; and these, watered three or four times at fortnightly intervals, have yielded a most satisfactory crop of bunching greens, which have just been cleared off the land (October, 1867), having been sold for 10*l.* an acre.

To return to the Italian ryegrass:—Plots 5 and 6, and 8 to 20 threw up a second crop in November, 1866, which, during the unusually mild December of that year, became so thick and heavy, that, fearing a fall of snow might lay it flat and rot it on the ground, and having now a considerable stock of cows at the homestead, it was resolved to cut and carry it and consume it green. It weighed about 6 or 7 tons per acre. We continued to cut it during December, getting over it at the rate of two or three acres a week; so that when the very severe frosts of last January fell upon it they attacked a considerable extent of grass land, or rather of grass root, unprotected by any subsequent growth of leaf; and several acres in plots 9, 10, 11, 12, and 13 were killed down. Wherever the growth had been most succulent and abundant, and the scythe, pulled downward by the weight of grass, had cut nearest the ground, the mischief done was greatest. In any half-grown portions which had been imperfectly sewaged, where the scythe, having little to do, had gone lightly over the land, the plant remained alive.

These beds were extremely unsightly all through the early spring; the blank patches were harrowed and re-sown, and a plant came up, but there never was a perfect covering of grass, and many tons per acre in the crop of 1867 have no doubt been lost owing to that misfortune. The loss was, however, fortunately confined to only a few acres of the land that had been earliest sown.

The seed sown late in October over plots 28 to 51 had come up, so that towards the end of the year the whole, when seen aslant the surface, had become green. This plant, however, which one would have supposed to be thus in its very weakest stage of growth, suffered no harm whatever from the frost; which appeared to be injurious only when a freshly-cut plant and a freshly-exposed root were laid open to it.

During the whole of the winter the sewage was being poured more or less continuously over the land. I had wished that no use should be made of it at a time when certainly little use could be made of it by the plant; contending that it was certain to go very much to waste if applied when the plant necessarily lay dormant. But, on the other hand, it was urged that if the farm was to be a normal specimen of sewage-agriculture, seeing that the day's sewage of London taken throughout the year had to be made use of, an aliquot part of the year's supply ought every [illegible] to be received and used. And it was further contended that

sive dosing with sewage (just as the excessive dosing with ıter in an ordinary water-meadow), would overcome the . keep the plant in a growing state, in spite of it.

eve our experience proves that here, as in agriculture ere, it is a wasteful process to attempt to overcome the tendencies of things, or try to gain your end while the :endency is unpropitious. The whole art of the farmer in so timing all his doings, that the natural tendency ıe into useful operation just when he wants it. It is thus performs his fallow operations chiefly before winter, osts are the best fallow-implements he has; and it is thus :he processes of seeding and manuring are timed, so that ɔn shall be a help and not a hindrance. For the same am certain that the proper way in which to gain from :he full amount of its fertilising power is to supply it at es only, and in such quantities only, as the plant naturally it, or is naturally able to deal with it. Even in the of the Company who have taken Lodge Farm to prove ɜ of London sewage, of which they have the concession for ɪf years, it is plain that it will be better that they should r sewage at its current value, whensoever and to whomso- nay then be worth it, rather than insist on the contracts urchase being annual, every man being required to take ot portion of his year's supply at regular intervals of time. ɔe worth 6*d.* or 1*s.* per ton to a market gardener during , and it may be almost worthless to a clay land arable n mid-winter. Let every man have it when he wants it rice it then is worth, and the maximum value throughout will be obtained.*

ɪe manner let the Company, as the tenants of Lodge ɔt, as every one of those to whom they hope to sell this ındoubtedly will act—use it only when it is likely to be ble—and certainly in that way the maximum result will ined with the least expenditure. It is partly owing to teful use of large quantities of sewage during the cold of January and early spring, when but little use could : of it by growing plants, that the results of the year at Farm have not been greater, when compared with the of sewage that has been applied.

ıer reason for the large quantity of sewage which has ed during the year needs mention, not only because it

uite possible, nevertheless, that the importance to the Company of dis- its sewage during the winter as well as during the summer, and the to the farmer of obtaining it at a cheaper rate during the former season np together, as that contracts at an average price shall be expedient for ɔiers, who may thus find it their interest to store it during the periods of ative inefficiency against the time when plants require it.

applied severely to us, but because it may exert a mischievous effect elsewhere. When the water was first poured from the tank through the surface-carriers on to the land, probably not a quarter of that which was delivered by the pump ever reached the plant. The carriers, cut as open ditches through the surface-soil, were dug into the hollow gravelly ground; and an immense quantity of the sewage at once went to waste (being drunk in by the subsoil), and never got on the land at all. The necessity of clogging these ditches by which it was to be carried became another reason for not bringing the settling tank into use. All the mud the water could bring with it was sent along, in the hope that it would ultimately make the carriers water-tight. And probably the waste which must at first have been much more than half the whole supply, has fallen at length to be merely one in ten, so that nine-tenths of what passes from the tank now reaches the surface of the land where it is to act. Of the quantities, amounting sometimes to 10,000, and in one case to 14,000 tons a week, which were applied in January, averaging, indeed, nearly 7500 tons weekly for the nine weeks preceding March 20, it is plain that a very large quantity indeed must have gone to waste. And a loss was thus incurred at Lodge Farm which would not have occurred on land of a less hollow and more impervious character. On such land, too, if the slopes were as favourable as they were with us, the great advantage would have been possible of using the water a second, and even a third time. The "tail" water of an upper bed would become the head-water of a lower bed, and the whole contents of the sewage would be thoroughly exhausted before it left the farm. At Lodge Farm the land was laid out with especial reference to this power which the slopes gave of using the water a second, and, in some cases, even a third and a fourth time. And the strip of flat meadow-land (1441 and 1515 on the map) along the brook side on the western edge of the farm was laid out water-meadow fashion, so as to enable us to give the last tail-water from the Italian ryegrass on the slopes above, a final cleaning before it reached the stream. But the open nature of the land is such that very little of the sewage is ever used a second time. By far the greater quantity of it sinks in as soon as it comes upon the surface, and disappears into the subsoil and the drainage.

And here, again, no doubt the experience of Lodge Farm of the value of sewage-water must suffer on comparison with that of a farm of stiffer soil.

I here add a table of the area of the several plots upon the map, giving in its successive columns a reference to the beds over which the tail-water of the several panes might be used second, third, or fourth, and, in some few cases, even a fifth, if should not long before have sunk altogether out of sight.

r on	Extent.			Panes on which the Sewage may be used a Second Time.	Panes on which the Sewage may be used a Third Time.	Panes on which the Sewage may be used a Fourth Time.	Panes on which the Sewage may be used a Fifth Time.
	A.	R.	P.				
	4	3	37	..	..	..	..
	0	2	1				
	0	3	35				
	1	2	20	Above O'	1515	..	..
	1	2	0				
	0	3	26				
	0	2	2				
	0	3	16	40	..	..	..
	1	3	7	41			
	1	2	18	42	38	1441	..
	2	0	3	43	39		
	1	3	2				
	0	3	27	31	38	1441	
	0	3	8	30	31	38	1441
	0	3	35	32	38	1441	..
	1	3	0				
	1	2	19	33	38	1441	..
	1	2	24	34			
	1	1	6	35	38	1441	..
	0	3	27	36			
	0	3	22				
	1	3	26	37	1441	..	..
	0	1	32				
	0	1	17	44	38	1441	..
	0	3	35				
	1	2	19	1442	1441	..	..
	1	0	21				
	0	1	8	31	38	1441	..
	0	1	24				
	0	1	29	38	1441	..	..
	0	1	23				
	0	1	37				
	0	1	23	38	1441	..	..
	0	1	33				
	0	1	23	1441	..	..	..
	0	1	23				
	0	1	9				
	0	2	36	39	..	..	..
	0	3	11				
	0	2	38	38	1441	..	..
	1	2	16				
	1	0	4	38	1441	..	..
	1	1	27	41	38	1441	..
	1	1	19	40	39	..	..
	0	1	24				
	1	2	17	52	1515	..	..
	2	0	5	1515	..	..	..
	0	1	38	1515	..	..	..
r F	3	2	0	..	..	..	..
..	55	2	32				

With the exception of Nos. 1, 2, and 7, the times when these several plots were sown have been already named. The surface of No. 1 was "sized" as truly flat and even, as it was possible to make it, and it was sown with Italian rye-grass in the end of March this year (1867). Nos. 7 and 3 were both sown in April. No. 2 (half an acre) was sown with mangold-wurzel and Kohl-rabi in the month of May. The mangold seed was drilled in ridges in the usual way, and singled out in July, the headlands and several longitudinal rows receiving Kohl-rabi plants transplanted into them in August. This plot I may at once say received, at three separate times during the summer 550 tons of sewage, or about 1100 tons per acre in all. The mangolds were horse-hoed after the land had dried between the dressings it received; and the crop (taken up in October), off little more than one-third of an acre, weighed 18 tons and half a cwt., equal to upwards of 50 tons an acre. No other manure than sewage had been applied except over about four perches at one end of it, where a dressing of farm-yard dung was given, and where, notwithstanding, there was really very little difference in the crop; which over the whole piece actually doubled in weight per acre the crop over nearly 40 acres in the other division of the farm, where land quite as good had received 20 tons of cowhouse-dung, together with more than 5 cwt. of mixed guano, superphosphate, and common salt, per acre. The plot of mangold-wurzel, though mentioned thus incidentally, is really one of the agricultural maxima of the year, and ought to have an important place in any careful discussion of the value of town-sewage to the ordinary farmer.

I may add that, along the southern side of plot No. 1, a strip, about equal in extent to No. 2, was cultivated in patches of celery, lucerne, potatoes, and flax, and received occasional dressings of sewage during the summer. The celery put in late has come to a wonderfully successful growth, the lucerne has done very well, the potatoes produced a great quantity of haulm, and a satisfactory crop of tubers, and the flax, which has not yet been dressed, produced a fair quantity of straw. On the potato and flax-land, since dug up, leeks have been dibbled and onions have been sown, and the former promise very well indeed. In all these cases no other manure than sewage has been used, and the results may be stated generally to be satisfactory.

I now direct attention exclusively to the Italian ryegrass. During the winter, roads were made across the beds in the positions marked upon the map, and three sheds (D, E, and F on the map) for 60 cows a-piece were placed severally on these roads in the positions most convenient for the delivery and consumption of the grass. During the spring of 1867 the farther plots, below shed F upon the map, were sown, making the whole

area under Italian ryegrass sown between June, 1866, and April, 1867, rather more than 55 acres.

Before stating what the produce has been, it is proper to describe the means by which it has been ascertained and recorded. During the spring and early summer of this year from 200 to 250 cows were fed upon the farm, receiving from 1 to 1½ cwts. of grass daily a-piece, besides other food. Of these about 70 were housed in sheds at the homestead, and the others in the 4 outlying sheds, D, E, F, and G upon the map. A weigh-bridge had been erected at the homestead, and every cartload of grass that was brought there for either the cow-sheds or the stables was weighed. Much of what went to the shed D was also weighed. Probably one load of every three had thus its actual weight recorded; and it was assumed as regards the others (of course, under daily superintendence) that the order given to fill the loads alike would be obeyed; so that knowing the weight of every third load, the number of the others would suffice as a guide to the quantity cut every day. A daily record was kept in this way of the grass mown; and the total weekly amount is given in the following table.

As to the quantity of sewage applied, the number of tons sent through the pipe to the tank is known with accuracy, but the *distribution* of that quantity is only estimated. For example, it is known that during a certain week the pump was going 20 hours; so that 6000 tons of sewage were delivered into the tank. It is known that the stream was directed during 5 of these hours over plots 2 and 5 (together 2 acres in extent), and they were accordingly "estimated" to have had one quarter of that week's quantity, or about 750 tons per acre; and so of the others.

It is in that way, then, that the record has been kept, out of which the following table has been constructed, in which the total quantity of sewage applied to this area of grass every week is given, and the total quantity of grass cut from this area every week is also given:—

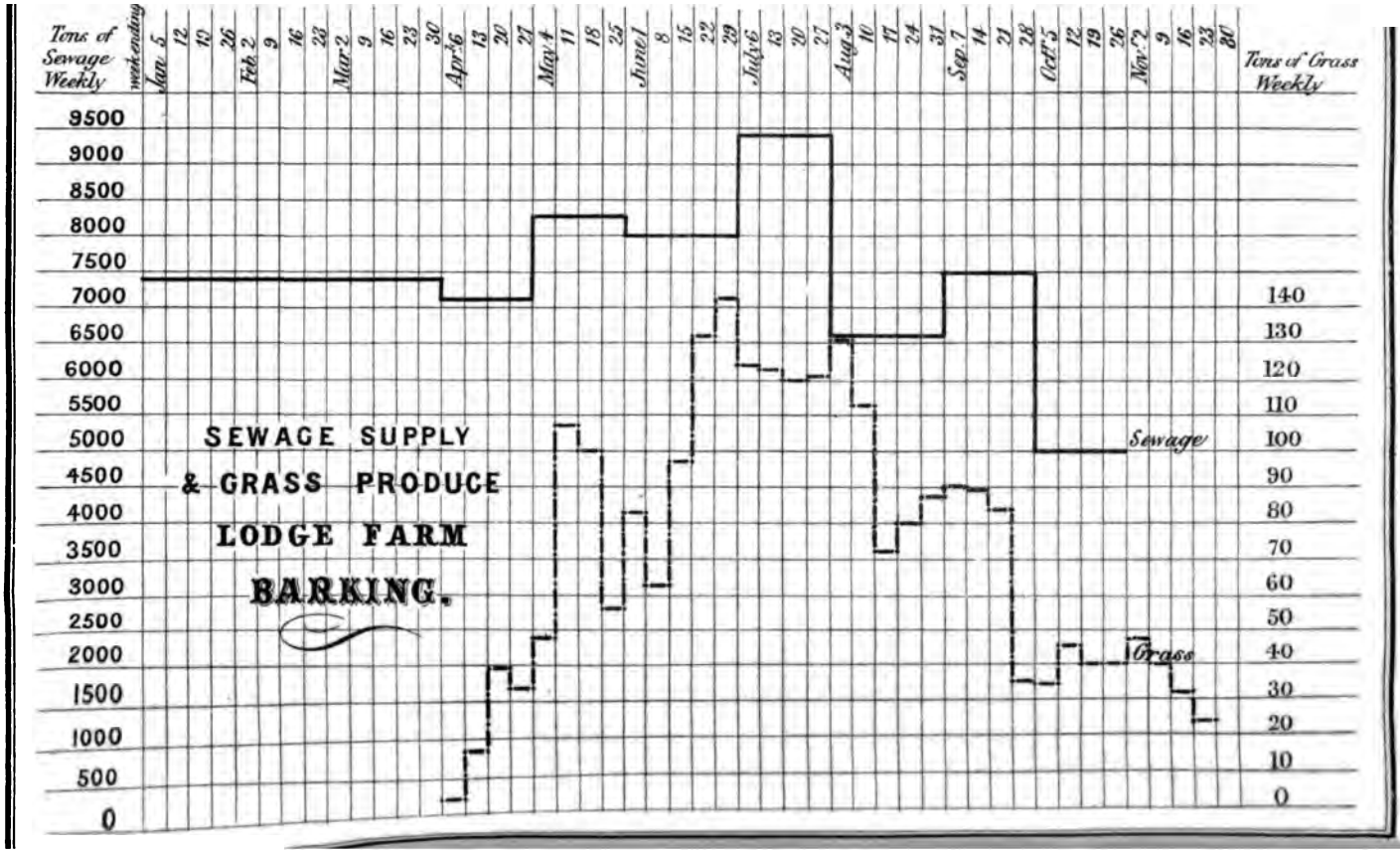
Week ending		Sewage applied.	Grass Cut.	Week ending		Sewage applied.	Grass Cut.
		Tons.	Tons.			Tons.	Tons.
January	26	8,090	..	Brought forward		60,230	..
February	2	14,710	..	,,	23	600	..
,,	9	1,150	..	,,	30	12,920	..
,,	16	11,890	..	April	6	9,450	2
,,	23	10,360	..	,,	13	9,650	16½
March	2	8,700	..	,,	20	7,550	40
,,	9	600	..	,,	27	1,970	35½
,,	16	4,730	..	May	4	7,120	49
Carried forward		60,230		Carried forward		109,490	143

TABLE—*continued.*

Week ending		Sewage applied.	Grass Cut.	Week ending		Sewage applied
		Tons.	Tons.			Tons.
Brought forward		109,490	143	Brought forward		236,140
May	11	2,000	107½	August	24	4,150
,,	18	10,900	100	,,	31	6,050
,,	25	13,100	55½	September	7	7,300
June	1	11,300	83½	,,	14	8,540
,,	8	10,200	62½	,,	21	7,100
,,	15	6,900	96	,,	28	7,150
,,	22	5,050	132½	October	5	6,450
,,	29	6,250	142½	,,	12	7,100
July	6	10,300	124	,,	19	5,100
,,	13	8,850	122	,,	26	1,600
,,	20	8,800	119	November	2	2,000
,,	27	9,900	120	,,	9	1,050
August	3	9,250	133	,,	16	..
,,	10	7,400	112	,,	23	700
,,	17	6,450	73	,,	30	..
Carried forward		236,140	1726	Total ..	..	300,430

The same table is represented in a way which mc diately catches the eye in the following diagram; wl ever, while the cut of grass is given weekly, the sewage to the land is averaged so as to represent the per week in successive periods of 4 or 5 weeks each. be added here, too, that the quantity of sewage app October 26 (1867) is not given in the table. That q however, very small—2000 tons were added in the we Nov. 2, and 1050 in the week ending Novembe since.

The principal fact is that while 300,000 tons of se been poured on, 2500 tons of grass have been cut off 5 land. I have no hesitation, however, in saying that i desires to learn from these figures the quantity which has been needed to add a ton of grass to tl produce of our fields, he must cancel a very larg of the sewage applied at Lodge Farm in January and before the season of growth had arrived, because u circumstances it must, at least in my judgment, l nearly useless. He must also cancel one half of tl delivered during the first 4 weeks specified in the tabl it never reached the plant, being swallowed by the sub ditches. And for the same reason he must cancel a quarter of the sewage delivered during the following six weeks, and probably one-tenth of the quantit weekly since. Moreover, he must cancel a good d sewage which first arrived, though it actually was


SEWAGE SUPPLY
& GRASS PRODUCE
LODGE FARM
BARKING.
Tons of Sewage Weekly
week ending
Jan. 5
12
19
26
Feb. 2
9
16
23
Mar. 2
9
16
23
30
Apr. 6
13
20
27
May 4
11
18
25
June 1
8
15
22
29
July 6
13
20
27
Aug. 3
10
17
24
31
Sep. 7
14
21
28
Oct. 5
12
19
26
Nov. 2
9
16
23
30
Tons of Grass Weekly
9500
9000
8500
8000
7500
7000
6500
6000
5500
5000
4500
4000
3500
3000
2500
2000
1500
1000
500
0
140
130
120
110
100
90
80
70
60
50
40
30
20
10
0
Sewage
Grass

the grassy surface of the ground for which it was intended, se—being then used merely as an indicator of those uneven- s of the surface, which through its means were pointed out orrection (the process formerly referred to as "sizing")—a deal went to waste. All this would reduce the 300,000 delivered on the farm to something more nearly 250,000 made actually serviceable. And besides this, he must bear in l that plots 1, 3, 13, 49, and 50, and the land below F (altogether t 11 acres) were sown in the spring of 1867, and did not come bearing till July;* that plots 28 to 52 (16½ acres) were sown te as last October, and did not come into bearing till the end lay and June; that plot 4 (1½ acres) was ploughed up in ust, and has only borne half a crop; and that plots 9 to 15 ut 9 acres) were cut down by the frost, and though resown, have yielded about ¾ of their proper crop. In fact, only plots 5, , 16, 17, 18, 19, 20, 21, 25, 26, and 27 can be said to have luced their full and proper yield of grass; and even of these, nd 21 were sown so late as September, 1866, and did not e into bearing so early as they would if they had been sown re.

'hat then has been the yield on these 11 plots, which occupy . 0R. 24P? It is stated in the table on the following page, which it will be seen that 6 or 7 cuttings off that extent of have yielded 800 tons of grass, or close on 61 tons per acre. nd even here it will be noticed that plots Nos. 20 and 21, ch were sown as late as September, 1866, did not yield their cutting till a month after Nos. 18 and 19, which had been n in August; and in consequence, did not yield so much as others by nearly 8 tons an acre.

the whole area (55½ acres) had yielded as much as these s, which alone of all of them can be taken as having given a season's growth, the grass derived from 250,000 tons of age would have been not 2500, but 3250 tons of grass; or tly one ton for every 100 tons of sewage over and above the tons of grass which we may suppose that 55½ acres of land ssisted by manure of any kind would, under an Essex climate, rally produce. And I believe that the experience of another will bear out this, which is in some measure an estimate d upon the experience of 1867; and that we shall find that are able by the reasonable use of sewage on the land, to luce a ton of Italian rye-grass over and above the natural unassisted growth of the land for every 100 tons applied.

It should have been added also, that the distribution of the sewage over No. 1, neans of troughs, was very unsatisfactory. It was not only laborious and y, but inefficient, so that the grass came very patchy and unproductive; ed, off nearly 5 acres here, hardly 100 tons were cut this year.

To ensure this, however, we must, of course, take care to have the Italian ryegrass by which we do it always in a state of vigorous life; and to this end it must be ploughed up and resown oftener than has hitherto been thought to be required. This is, I think, proved both by No. 3 and Nos. 18 and 19, as well as by other plots that could be named. No. 3, though sown

Grass Cut during the Week ending	Plot 5. A. 1 R. 2 P. 0	Plot 6. A. 0 R. 3 P. 26	Plot 8. A. 0 R. 3 P. 16	Plots 16, 17. A. 3 R. 1 P. 19	Plots 18, 19. A. 2 R. 3 P. 30	Plots 20, 21. A. 1 R. 3 P. 9	Plots 25, 26, 27. A. 1 R. 3 P. 4
	Tons.	Tons.	Tons.	Tons.	Tons.	Tons.	Tons.
April 6	..	..	..	..	2	..	..
,, 13	..	..	..	..	16½	..	..
,, 20	..	..	11	..	..	..	18
,, 27	16	8	..	2½	..	..	5½
May 4	½	3½	..	35½	..	..	..
,, 11	..	..	..	..	..	20½	..
,, 18	..	..	9	..	37½	..	..
,, 25	11	6	1½	..	..	..	10½
June 1	..	..	..	11½	..	..	8½
,, 8	..	..	..	22½	..	..	..
,, 15	..	..	..	..	11½	14½	..
,, 22	..	10	8	..	17½	6	..
,, 29	9	..	2	..	..	..	..
July 6	10	..	..	23½	..	..	33½
,, 13	..	..	..	11½	27	2	..
,, 20	..	10	8½	..	..	15½	..
,, 27	..	..	..	..	..	..	..
August 3	14½	..	..	4	..	..	22½
,, 10	..	..	..	29½	26	13	..
,, 17	..	..	9	..	..	12½	..
,, 24	..	9½	..	..	..	..	..
,, 31	..	..	..	..	..	..	..
September 7	11	..	..	28	..	..	16
,, 14	..	..	..	..	23½	9	..
,, 21	..	4½	4	..	..	..	..
,, 28	..	..	..	..	..	..	10
October 5	..	..	..	..	..	..	..
,, 12	8	..	..	15½	..	..	..
,, 19	..	..	..	..	16	11	..
,, 26	..	4	4	..	..	..	..
November 2	..	..	..	..	..	..	..
,, 9	..	..	..	..	..	..	9
6	..	..	..	..	..	..	..
3	6½	..	..	..	..	..	..
[illegible]	..	..	..	..	2½	..	..
	86½	55½	57	184	180	104	133½

13A. 0R. 24P.
800½ tons.

[illegible] 6 or 7 times (as in the [illegible] and 15th, July 5th and 19th, August

September 20th, and again in October), receiving thus 1000 tons of sewage per acre, has yielded in 4 several s, in the weeks ending July 5th, August 16th, September and October 26th respectively, no less than 46½ tons, o close on 50 tons per acre. And the land there is now l with a first-rate growth against next year from a ghly well planted, strong, and vigorous root of Italian rye- Nos. 18 and 19, on the other hand, which were sown in , 1866, and have yielded in 7 cuttings (from a greater r of sewage dressings, however) no less than 180 tons off less than 3 acres, have now lost plant so much that lots have been ploughed up and resown. Sewage cannot he *nature* of the plant. Italian ryegrass is naturally ved, and will die in spite of us, however we may feed it. will only feed the plant in a wonderful manner when aturally in vigorous life; and to that end we must have a younger plant of it to feed than I had till this year sup- was necessary. Whether this is to be got by resowing ediately on ploughing it up, or by taking an intervening crop, and dressing that too with sewage, remains to be believe the best result will be obtained where such an inter- fallow crop is taken and well manured in the ordinary well as by the use of sewage; where, in fact, a consider- ortion of the sewage-grown grass is consumed in sheds he farm, and where there is consequently a large dung- be used upon the land which comes in course for sewage. l plough up the crop at the end of 18 months, and take a r crop of early potatoes or a winter crop of cabbages, dress- land heavily with farm-yard dung, and thus getting it in te order for resowing either in autumn or in spring. The nce we have had, however, with the sewage (only) in the of mangolds and of cabbages certainly encourages us to hat nothing else is wanted to produce the best results, r in market-gardens or on ordinary farms.

y add, too, here, that in a limited experiment an attempt ade to ascertain its value as a manure for wheat. A plot od and 21 perches in the field 1442 upon the map, which d 3 dressings of sewage when the land was dry in spring rly summer, all of them before the ear was formed, yielded hels of wheat, viz., after the rate of 43 bushels per acre loads of straw. Surrounding this plot on two sides, 2 nd 22 perches of similar land, in all respects similarly excepting only that it had no sewage, yielded 13½ of grain, or after the rate of 29 bushels per acre with 3 f straw. The result, certainly, is sufficiently encouraging ify a further experiment; which must, however, be con-

ducted, of course, with strict regard to the nature of the plant and crop. We must take care not to delude ourselves with the idea that because a ton of sewage may contain twopence worth of ammonia, and ammonia has been proved a good manure for wheat, that therefore a ton of water containing it is necessarily going to benefit the wheat crop. The application of water to the wheat crop must be carefully timed to the wants of the plant, or it will do more harm than good, whatever the quantity of ammonia it may carry with it. And on the other hand, the power of applying even water only on the land, let alone its fertilising contents in the case of sewage, may be of immense benefit to wheat or any other crop if there is a natural deficiency in the water supply at a time when a water supply is needed. Plots are now laid out on the farm, in order to determine the serviceableness of sewage to cabbages and rye, to strawberries, winter oats, and wheat; and it is hoped that a large and convincing body of evidence will, during the next two years, be obtained of an agricultural worth quite up to the chemist's estimate of its value with which this paper commenced.

At present, I believe we have proved that every 100 tons of sewage *used* during the past year have actually produced, under circumstances of average favourableness, 1 ton of grass over and above the quantity needed to pay an ordinary rent and an ordinary farm labour-bill. What that ton of grass is worth depends, of course, upon the use that is made of it. During the height of the summer we sold about 20*l.* worth of it weekly, partly delivered in London, 8 or 9 miles off, at 23*s.* per ton, to cowkeepers; and partly sold at home at 1*s.* and 1*s.* 3*d.* per perch, equal to from 18*s.* to 20*s.* a ton, upon the land. I need not go into our experience on the farm as large cowkeepers, by which an attempt was made to realise some of the experience of the London cowkeepers, who were able to pay us 23*s.* a ton for the grass we sold them. That is another subject altogether. Whether our business as cowkeepers was profitable or not, the fact remains that under the circumstances we grew 2488 tons of this grass on very poor and gravelly soil off 55½ acres with the help of sewage only, and 61 tons per acre off that portion of it which alone represented fair and average circumstances. What a ton of grass may be worth on ordinary grass-land farming any west-country farmer can, no doubt, tell us. That sewage-fed Italian rye-grass is first-rate food for cows our experience proves; and, when allowed to attain sufficient ripeness, it is first-rate food in the stable as well as in the cowhouse. [illegible] believe it will be found that under an ordinary agricultural [illegible] valuation of it (let alone the excessive value which it [illegible] near the large towns which have their sewage [illegible] grass can be produced over and above

he natural produce which will pay the rent of the land) for every .00 tons of ordinary sewage-water, any skilful farmer will succeed, by means of it, in extracting from that quantity of town drainage quite as many pence per ton as the skilful chemist can extract from it in the shape of ammonia, phosphorus. and potash.

My report, however, does not profess to discuss the possibilities of the sewage problem; it is a mere account of 12 months' use of 300,000 tons of sewage over 55 acres of poor and porous soil. We may possibly hereafter find that such a vigorous system of depletion, as well as of repletion, as the use of 3000 or 4000 tons of town water on an acre necessarily involves will altogether upset all the notions which have arisen out of ordinary agriculture. We may find ourselves able to grow the same annual plant in successive years by means of it on a given field, just as it appears we can in wonderful abundance produce perennial grass in perpetuity.* Wheat may possibly be taken year after year successively, or alternately with other grain crops; and land which has, in the language of one theory, been poisoned by the repeated growth of a given crop, may prove that repeated washings with sewage make it always fresh; or if, in the language of another theory, it has been exhausted by cross-cropping, it may be found that frequent sewage-dressings will keep it always replenished.

Moreover, the edges of the winter period when not even sewage will make plants grow may be utilised much more perfectly than they are; for, after wheat-harvest there is ample time to grow, under almost any plan of sewage-agriculture, a valuable crop of greens or cabbages, or even rye, before the

* The power of sewage to produce a crop of succulent growth with a very minimum, if any, of assistance from the soil itself, has indeed been amply illustrated in an experiment of sufficient extent not far from this farm. One of the features of the plan of dealing with North London sewage, for which Parliamentary powers were originally obtained, was the reclamation of a large portion of the many square miles of sand which the tide lays bare by Foulness, at the mouth of the Thames; and there fertilising some 8000 or 10,000 acres by sewage irrigation. Although similar work has been actually done with the best results near Leith, with the water of the Edinburgh "Foul Burn," it was thought desirable to test the fitness of the Maplin sand from Foulness for the use of sewage on it. About 3000 cubic yards of the sand were accordingly barged up to the sewage outfall below Barking, and there spread some 30 inches deep over an acre of abandoned contractor's yard, which was levelled for the purpose. This acre of sand was smoothed with a slope of about 1 in 120 and sown with Italian rye-grass in March 1866. Three or four cuttings of grass were taken from it during that year, one of them close on 20 tons per acre, and the others at intervals of four or five weeks varying from 8 to 12 tons per acre. The plant received frequent abundant floodings with the water from the sewer alongside of it. I am unable to say, however, how much exactly either of sewage it received or of grass it produced. But it is certain that very heavy crops of grass were produced by the use of sewage alone upon this sheer sea-sand, which could have contributed hardly anything to the growth of the crop. Smaller plots of the sand were planted with mangold-wurzel, celery, and carrots, and yielded satisfactorily.

spring seed-time of a succeeding grain-crop shall come round. We shall, another year, have illustrations on Lodge Farm of all these points; and ordinary agriculture, as well as market-gardening, will, we hope, find reason to be glad that the waste water of our towns is at length made serviceable. If it can be delivered on our fields at an average cost which shall not exceed 1*d.* a ton, we have every reason to believe that it will be most profitable to the ordinary farmer, as well as to the suburban market-gardener, to apply it. Wherever there is already a sloping surface, it can be distributed by carriers and furrows, which need not cost a half-year's rent to make. Where the land is flat, or nearly so, the surface formation will cost five times as much; but in this case the "lands" will be permanent, and the carriers and drains will remain from year to year (the cultivation of each "pane" being done as a separate field); and no annual expense of carrier making afterwards will be needed. One man can thus regulate the distribution of 300 tons an hour with the greatest ease, and serve 10 acres daily without difficulty.

We strongly advise that where the land is flat, or nearly so, no attempt be made to water it by troughs or hose. Let the surface be laid out, even though it be at the larger cost, in wide lands, with a fall of 1 in from 120 to 200—the latter is sufficient in soils of ordinary stiffness; the work will be so much easier and better afterwards as fully to justify the increased cost at first.

Of the ability of the soil thus used not only to save the enormous waste of which our towns are now guilty, but to abate the filthy nuisance from which they now are suffering, I need not speak. Its power to deodorise, as well as that of the sewage which it receives to fertilise, is now a well-known fact. Of course, all these things are matters of degree. It is possible to put sewage on so rapidly, or to have it come so strong and foul, that at the ordinary rate of distribution it may fail of being perfectly cleaned before it leaves the land. On Lodge Farm it has occasionally come—generally on a Monday (when it is less diluted with the washings of ordinary week-days), or with the first showers after a drought which wash away the sediment in culverts where it may have been putrefying during a long period of rest—so filthy and offensive that not only the tank but the fields on which it has been lying are for the time a nuisance. Almost always, however, though the tank may smell offensively when you stand to leeward of it, the fields over which the sewage at the same time trickling have no smell at all, and the water, [illegible] the land, is virtually clear.

[illegible] December, 1867.

—*The Influence of Summer Temperature upon the Productiveness of the Wheat Crop.* By JOHN ALGERNON CLARKE.

IE object of this paper is to support the conclusion of Mr. ıwes and others that the general yield of wheat in England, ıd therefore to some extent the market chances of grain-growers, ıd the food prospects of the nation at large, are determinable ıforehand by the simple test of the weather which precedes a ırvest.

In 1850 the 'Journal of the Royal Agricultural Society' coninued a Prize Essay by Mr. Nicholas Whitley, of Truro, on The Climate of the British Islands in its Effect on Cultivation," ı which Mr. Philip Pusey appended the following note: "This aper appears to me one of the most valuable contributions yet ıade by science to practical agriculture." And by a comparison f summer heat with the condition of the wheat crop from the ear 1775 to 1836, Mr. Whitley showed, that while an average ımmer temperature occasionally produced a good harvest ıamely, in years when there was a short rainfall), only a tempera-ıre above the mean was found to give a full and abundant yield; nd that, on the contrary, a temperature of the summer months wo or three degrees below the mean invariably brought defiiency in quantity and inferiority of sample. The facts gathered om the meteorological observations of the Royal Society, from 'ooke's 'History of Prices,' and from a return made to the louse of Commons in 1843 on the price of wheat, were tabulated ıus, giving only those years marked by peculiar abundance or eficiency. (See table next page.)

"From this table," says Mr. Whitley, "the connexion between ıe temperature of the summer and the produce of the harvest is ıost obvious and instructive. An average amount of heat ccasionally produced a good crop, as in 1791; but the experience ıows that it must be accompanied by a dry season. In 1840, ıe summer temperature at Truro was 59°, or 1° below the ıean; but not much above half the usual quantity of rain fell. ı finer harvest since 1818 never occurred in the West of ngland; the wheat crop was above the average, and the yield xcellent. But though the harvest will succeed in England at n ordinary summer temperature, or even 1° below, other things eing equal, Scotland is extremely sensitive to the least epression of summer heat, as shown by the effects of the ummers of 1800 and 1836, when the wheat was saved in olerable condition in England, while a large portion of the crop vas completely lost in Scotland.

"The table shows that a cold, wet summer is followed b most lamentable consequences. A deficiency of only 2° of falls with a withering influence on the harvest prospects when it amounts to 3° or 4°, dearth and famine follow train. . . . . Those summers which have been more

Year.	Variation of the Temperature of the Season from the mean of 65 Years.		State and Condition of the Wheat Crop.
	Spring.	Summer.	
	Degrees.	Degrees.	
1775	+1·7	+1·2	Plentiful harvest.
1779	+4·3	+2·3	Season of great fertility, the crop one above a medium.
1789	−2·6	−2·0	Very deficient crop.
1791	+0·2	−0·5	Abundant crop. Dry season (?).
1792	−1·3	−1·6	Inferior harvest. Much injured by wet.
1795	−1·3	−2·2	Very defective crop; followed by a des which many of the poor perished.
1799	−3·8	−2·3	Wet, cold summer; much grain injur destroyed.
1800	+0·1	+0·7	Bad crop, partly saved in England. In S much corn did not ripen; destituti famine followed. Much rain.
1809	−0·1	−1·3	Deficient crop. The rain set in in Ju continued to October. Wheat suffere mildew and sprouting.
1810	−0·4	−3·7	Bad, scanty crop. Well got in.
1811	+2·2	−1·7	Five-eighths of an average crop. High w blossoming time, and little sun and harvest.
1812	−2·8	−3·8	Defective and bad crop. A famine yea
1816	−2·7	−4·8	Great deficiency in quantity and quality. rain and stormy winds in July, until l
1818	−0·2	+4·3	A remarkably dry, hot summer; no r four months from middle of May. W average crop in the eastern countie heavy and abundant in the west.
1822	+3·4	+2·2	Full average produce. Quality univ good.
1825	+0·4	+2·0	Universally early and promising harves
1826	+0·9	+4·0	Remarkably early harvest; crop and co very good. Very dry in the west, a excellent.
834	+0·5	+2·5	A most productive harvest.
83[illegible]	+0·5	+2·6	Great bulk of straw, much laid by rain i On the whole, a good crop.
[illegible]	+0·1	+0·3	Medium crop in England. In Scotla cold, with rain in July and August remarkably backward; a portion ripened.

[illegible] have generally been accompanied by a [illegible]ity of rain. I[illegible] rain has been the cause [illegible] of the thermometer. S

ason tends to produce a large amount of straw, which, on a ontinuance of damp weather, is peculiarly liable to be attacked y disease; hence in the wet years of 1809, 1810, and 1811, uch damage was done by mildew.

"Turning our attention to the years when the summer temerature has been in excess, it is found that the abundance of he crop, and the perfection of the grain, have almost invariably een of the most cheering character. An occasional high wind luring the flowering time, or a sudden change of weather at arvest, may in some years have done injury; but, generally, he height of the thermometer is a good indication of the proluctiveness of the harvest.

"These islands seldom suffer (in respect to the wheat crop) rom an excess of heat; and it is of great national importance hat a year of drought followed by deficiency scarcely ever occurs. The year 1818 was that which approached the nearest to this haracter, when no rain fell for four succeeding months; but ven then, though the straw was remarkably scanty in the eastern istricts, the ear was crowded with grain. In the south-western ounties the crop was of the most abundant description; and well remember the feeling of astonishment with which, on my ther's farm, I viewed this crop with several friends, gathering e finest ears, and observing that five grains in a row on each ide was almost universal. To use a common phrase, 'It was erned like peas.'"

These valuable deductions of Mr. Whitley may be considered established up to the date at which he wrote, namely, 1849. ut it is worth our while to inquire whether the same laws of roduction have held good up to the present time, or whether an melioration of climate gradually taking place from extended nd drainage, deeper tillage, and other accompaniments of odern husbandry, has altered the conditions under which high mperature was found indispensable to a great productiveness wheat; or again, whether the habit of the wheat plant has een so influenced by repeated cultivation under artificial anagement, as to be no longer dependent upon slight excesses deficiencies of season temperature. The answer will be best rnished by comparing the summer temperature with the aracter of the harvest during the last few years, and by way of sufficiently extended basis we will take the twenty-two years om 1846 to this present 1867. The mean temperature, &c., e extract from Mr. Robert Thompson's observations at Chisick; the averages, of course, have been a matter of arithmetic; nd the nature of each one of the several harvests we have arned from the 'Agricultural Gazette' of each period. Without

coming to niceties, it will be sufficient for our purpose to tabulate the average daily mean temperature, and the total rainfall in each week of July and August, noting by *plus* and *minus* signs the difference of the items from the average of a great number of years.

1846.

Week ending	Mean Temperature.	Difference from the Average of 41 Years ending 1867.	Inches of Rainfall.	Difference from the Average of 90 Years.
	Degrees.	Degrees.		
July 2	63·8	+1·1	0·21	
,, 9	66·3	+3·7	0·61	
,, 16	64·7	+2·4	0·41	
,, 23	64·0	+1·5	0·37	
,, 30	..	..	..	
August 6	71·0	+8·1	3·20	
,, 13	63·8	+1·8	0·50	
,, 20	62·1	+1·3	0·75	
,, 27	61·9	+1·1	0·03	
Average	66·2	+2·6	..	

The wheat crop of 1846 was generally good, and over an average. Oats and barley were hardly an average.

1847.

Week ending	Mean Temperature.	Difference from the Average of 41 Years ending 1867.	Inches of Rainfall.	Difference from the Average of 90 Years.
	Degrees.	Degrees.		
July 8	64·5	+1·9	0·20	
,, 15	71·8	+9·5	0·02	
,, 22	64·3	+1·8	0·57	
,, 29	63·3	+0·9	0·00	
August 5	64·6	+1·7	0·30	
,, 12	62·3	+0·3	0·17	
,, 19	66·2	+5·4	0·86	
,, 26	59·1	−1·7	0·10	
September 2	59·1	−1·2	0·08	
Average	63·9	+2·0	Total 2·30	−2·70 inches

In 1847 the wheat crop was considerably over an average in quantity, but not of prime quality, and it suffered very much from mildew, and to some extent from red gum. Barley was much over an average. Oats only average.

1848.

Week ending	Mean Temperature.	Difference from the Average of 41 Years ending 1867.	Inches of Rainfall.	Difference from the Average of 90 Years.
	Degrees.	Degrees.		
y 6	60·4	−2·2	0·48	
13	62·0	−0·3	0·61	
20	63·5	+1·0	0·11	
27	62·5	+0·1	0·77	
st 3	61·4	−1·5	0·81	
10	58·0	−4·0	0·79	
17	59·5	−1·3	1·22	
24	57·3	−3·5	0·62	
31	60·9	+0·6	1·48	
verage	60·6	−1·2	Total 6·89	+1·89 inches

1848 there was promise of a fair average wheat crop, but atter half of August was wet, and the harvest deficient. were a poor crop and barley very various.

1849.

Week ending	Mean Temperature.	Difference from the Average of 41 Years ending 1867.	Inches of Rainfall.	Difference from the Average of 90 Years.
	Degrees.	Degrees.		
5	60·8	−1·9	0·03	
12	66·2	+3·6	0·00	
19	62·5	+0·2	0·35	
26	58·7	−3·8	2·20	
st 2	61·3	−1·1	0·29	
9	62·4	−0·5	0·59	
16	62·8	+0·8	0·61	
23	61·2	+0·4	0·01	
30	65·3	+4·5	0·07	
verage	62·3	+0·2	Total 4·15	−0·85 inches

e wheat crops were very good, and over an average.

1850.

Week ending	Mean Temperature.	Difference from the Average of 41 Years ending 1867.	Inches of Rainfall.	Difference from the Average of 90 Years.
	Degrees.	Degrees.		
4	59·5	−3·2	0·90	
11	56·0	−6·6	0·58	
18	66·3	+4·0	0·76	
25	64·2	+1·7	0·42	
t 1	62·7	+0·3	0·34	
8	64·8	+1·9	0·12	
15	61·9	−0·1	0·27	
22	57·4	−3·4	0·46	
29	55·1	−5·7	0·21	
verage	60·5	−1·2	Total 4·06	−0·94 inches

The harvest of 1850 was much under an average, with gre losses by mildew and by winds. The crops were better in t north.

1851.

Week ending	Mean Temperature.	Difference from the Average of 41 Years ending 1867.	Inches of Rainfall.	Difference fro the Average 90 Years.
	Degrees.	Degrees.		
July 3	66·9	+4·2	1·18	
,, 10	58·3	−4·3	0·48	
,, 17	59·5	−2·8	0·22	
,, 24	60·3	−2·2	1·37	
,, 31	62·7	+0·3	0·65	
August 7	65·9	+3·0	0·02	
,, 14	65·4	+3·4	0·02	
,, 21	63·0	+2·2	0·30	
,, 28	60·8	0·0	1·62	
Average	62·5	+0·4	Total 5·86	+0·86 inch

A late harvest gave a full average crop both of wheat a barley.

1852.

Week ending	Mean Temperature.	Difference from the Average of 41 Years ending 1867.	Inches of Rainfall.	Difference fr the Average 90 Years.
	Degrees.	Degrees.		
July 8	70·7	+8·1	0·00	
,, 15	70·0	+7·7	0·20	
,, 22 ..	65·3	+2·8	1·62	
, 29	65·8	+3·4	0·46	
	62·7	−0·2	0·08	
	60·0	−2·0	2·15	
	63·1	+2·3	1·40	
	63·4	+2·6	0·08	
	60·8	+0·5	0·00	
	64·6	+2·8	Total 5·99	+0·99 incl

There was a wet harvest in 1852, with "grown" wheat and a ıeral prevalence of mildew, all the mischief done by a tnight's warm wet weather in August. The crop otherwise uld have been much over an average, but as it was, gave ield considerably under an average. There were fine unin-ed crops in Scotland.

1853.

Week ending	Mean Temperature.	Difference from the Average of 41 Years ending 1867.	Inches of Rainfall.	Difference from the Average of 90 Years.
	Degrees.	Degrees.		
July 7	63·5	+0·9	0·36	
,, 14	62·2	−0·1	1·76	
,, 21	59·8	−2·7	1·03	
,, 28	62·1	−0·3	1·13	
August 4	62·5	−0·4	0·06	
,, 11	59·6	−2·4	0·00	
,, 18	58·7	−2·1	0·36	
,, 25	61·3	+0·5	0·94	
ptember 1	56·7	−3·6	1·34	
Average	60·5	−1·1	Total 6·98	+1·98 inches

The wheat crop was very much below an average; a thin ınt and a late harvest. Oats and barley were average, except the northern counties and in Scotland.

1854.

Week ending	Mean Temperature.	Difference from the Average of 41 Years ending 1867.	Inches of Rainfall.	Difference from the Average of 90 Years.
	Degrees.	Degrees.		
uly 6	58·8	−3·9	0·64	
,, 13	58·0	−4·6	0·80	
,, 20	60·9	−1·4	0·04	
,, 27	67·1	+4·6	0·54	
gust 3	61·4	−1·0	1·73	
, 10	58·4	−4·5	0·43	
, 17	60·4	−1·6	0·22	
, 24	60·8	0·0	0·21	
, 31	63·5	+2·7	0·00	
Average	61·0	−1·0	Total 4·61	−0·39 inches

Wheat in some districts over an average, and of good quality; many districts variable. Some mildew and sprouting. Oats l barley good.

1855.

Week ending	Mean Temperature.	Difference from the Average of 41 Years ending 1867.	Inches of Rainfall.	Difference from the Average of 90 Years.
	Degrees.	Degrees.		
July 5	64·8	+2·1	0·01	
,, 12	65·5	+2·9	1·69	
,, 19	61·5	−0·8	1·47	
,, 26	62·0	−0·5	2·24	
August 2	62·3	−0·1	1·08	
,, 9	61·3	−1·1	1·06	
,, 16	61·6	−0·4	0·01	
,, 23	64·0	+3·2	0·19	
,, 30	59·2	−1·6	0·00	
Average	62·4	+0·4	Total 7·75	+2·75 inches

The wheat crop of 1855 was under an average, and of inferior quality, knocked down by heavy rains in the last week of July. The harvest weather was fine, though the time was late. In the south the plant had been injured in winter by frost and insects. Barley was abundant, but coarse and injured in colour. Oats were an average crop in England, below an average in Scotland, and above an average in Ireland.

1856.

Week ending	Mean Temperature.	Difference from the Average of 41 Years ending 1867.	Inches of Rainfall.	Difference from the Average of 90 Years.
	Degrees.	Degrees.		
July 3	60·3	−2·4	0·00	
,, 10	56·5	−6·1	0·77	
,, 17	60·1	−2·1	0·21	
,, 24	66·4	+3·9	0·13	
,, 31	64·3	+1·9	0·22	
August 7	67·1	+4·2	0·00	
,, 14	66·8	+4·8	1·02	
,, 21	60·5	−0·3	2·32	
,, 28	60·2	−0·6	0·11	
Average	62·4	+0·3	Total 4·78	−0·22 inches

The harvest was much beyond an average, both of wheat and barley.

1857.

Week ending	Mean Temperature.	Difference from the Average of 41 Years ending 1867.	Inches of Rainfall.	Difference from the Average of 90 Years.
	Degrees.	Degrees.		
ly 9	58·2	−4·4	0·55	
, 16	65·8	+3·5	0·23	
, 23	66·3	+3·8	0·00	
, 30	63·4	+1·0	0·36	
ust 6	66·8	+3·9	1·18	
, 13	64·4	+2·4	0·81	
, 20	63·7	+2·9	0·71	
, 27	..	..	..	
nber 3	60·5	+0·2	0·99	
verage	63·6	+2·7	Total	

heat was much above an average, "yielding" well; in fact, ctraordinarily productive crop. There was good harvest ıer, excepting that rains of the middle of August injured crops in the midland and western counties. Barley was y an average, and oats were below an average.

1858.

Week ending	Mean Temperature.	Difference from the Average of 41 Years ending 1867.	Inches of Rainfall.	Difference from the Average of 90 Years.
	Degrees.	Degrees.		
ly 8	58·3	−4·3	0·33	
, 15	65·0	+2·7	1·08	
, 22	62·8	+0·3	0·53	
, 29	60·0	−2·4	0·60	
ust 5	61·8	−1·1	0·01	
, 12	63·9	+1·9	0·12	
, 19	65·0	+4·2	0·81	
, 26	57·9	−2·9	0·36	
nber 2	55·4	−4·9	0·17	
verage	61·1	−0·7	Total 4·01	−0·99 inches

e harvest of 1858 was about ten days later than usual. The crop was over an average, though less than the wonderfully

fine crop of 1857. The plant had suffered from the unusual drought of spring and summer. Oats and barley were under an average; the latter of inferior quality.

1859.

Week ending	Mean Temperature.	Difference from the Average of 41 Years ending 1867.	Inches of Rainfall.	Difference from the Average of 90 Years.
	Degrees.	Degrees.		
July 7	64·3	+1·7	0·80	
,, 14	67·2	+4·9	0·00	
,, 21	..	..	..	
,, 28	66·7	+4·3	0·13	
August 4	64·2	+1·3	0·41	
,, 11	62·7	+0·7	0·67	
,, 18	62·1	+1·3	0·47	
,, 25	65·8	+5·0	0·62	
September 1	57·0	−3·3	0·57	
Average	63·7	+1·9	Total	

Wheat under an average; injured by a too rapid ripening in July, and the heavy crops were much laid. Barley and oats under an average.

1860.

Week ending	Mean Temperature.	Difference from the Average of 41 Years ending 1867.	Inches of Rainfall.	Difference from the Average of 90 Years.
	Degrees.	Degrees.		
July 5	58·0	−4·7	0·22	
,, 12	56·9	−5·7	0·00	
,, 19	60·3	−2·0	0·23	
,, 26	54·4	−8·1	1·10	
August 2	60·1	−2·3	1·42	
,, 9	55·3	−7·6	0·67	
,, 16	58·4	−3·6	1·05	
,, 23	57·2	−3·6	1·23	
,, 30	57·6	−3·2	1·18	
September 6	55·3	−5·0	0·10	
Average	57·3	−4·5	Total 7·20	+2·20 inches

Harvest a fortnight behindhand, and very wet. A remarkably cold and rainy summer, in fact the most disastrous season known, produced a crop of heavy straw, much laid and knocked about. Wheat very far below an average; the worst for many years. Oats fair; barley good.

1861.

Week ending	Mean Temperature.	Difference from the Average of 41 Years ending 1867.	Inches of Rainfall.	Difference from the Average of 90 Years.
	Degrees.	Degrees.		
4	61·4	−1·3	0·33	
11	60·2	−2·4	0·43	
18	64·3	+2·0	0·30	
25	62·8	+0·3	0·45	
1	59·7	−2·7	0·55	
8	62·5	−0·4	0·35	
15	67·6	+5·6	0·03	
22	58·4	−2·4	0·12	
29	62·9	+2·1	0·00	
erage	62·2	−0·8	Total 2·56	−2·44 inches

eat was below an average, having suffered from excessive ss of plant. Oats were fair.

1862.

Week ending	Mean Temperature.	Difference from the Average of 41 Years ending 1867.	Inches of Rainfall.	Difference from the Average of 90 Years.
	Degrees.	Degrees.		
9	59·3	−3·3	1·05	
16	58·9	−3·4	0·72	
23	58·1	−4·4	0·29	
30	61·4	−1·0	0·03	
st 6	61·0	−1·9	0·14	
13	58·2	−3·8	0·46	
20	59·4	−1·4	1·60	
27	58·9	−1·9	0·01	
ber 3	58·5	−1·8	0·25	
erage	59·3	−2·5	Total 4·55	−0·45 inches

ps generally inferior in quality and below an average; one worst wheat crops known for many years. Storms of aused the plants to be root-fallen before the seed was fully . Barley barely an average.

1863.

Week ending	Mean Temperature.	Difference from the Average of 41 Years ending 1867.	Inches of Rainfall.	Difference fro the Average o 90 Years.
	Degrees.	Degrees.		
July 8	61·8	−0·8	0·01	
,, 15	63·2	+0·9	0·00	
,, 22	54·2	−8·3	0·63	
,, 29	57·5	−4·9	0·16	
August 5	63·1	+0·2	0·36	
,, 12	65·7	+3·7	0·04	
,, 19	61·4	+0·6	0·28	
,, 26	58·8	−2·0	0·92	
September 2	59·3	−1·0	0·54	
Average	60·5	−0·4	Total 2·94	−2·06 inch

Wheat a magnificent crop, and grain bold. Barley and oa average. The summer was specially dry, and there was brig sunshine at and after blossoming time.

1864.

Week ending	Mean Temperature.	Difference from the Average of 41 Years ending 1867.	Inches of Rainfall.	Difference fro the Average 90 Years.
	Degrees.	Degrees.		
July 6	..	..	..	
,, 13	59·0	−3·6	0·00	
,, 20	..	..	..	
,, 27	..	..	..	
August 3	61·7	−0·7	0·01	
,, 10	63·3	+0·4	0·00	
,, 17	57·9	−4·1	0·00	
,, 24	52·8	−8·0	0·88	
,, 31	58·0	−2·8	0·15	
Average			Total	

Wheat appeared to be an average crop, but turned out ve defective. Barley average; oats bad.

1865.

Week ending	Mean Temperature.	Difference from the Average of 41 Years ending 1867.	Inches of Rainfall.	Difference from the Average of 90 Years.
	Degrees.	Degrees.		
uly 5	61·5	−1·2	0·95	
,, 12	61·5	−1·1	0·69	
,, 19	62·8	+0·5	0·35	
,, 26	65·0	+2·5	0·52	
gust 2	59·1	−3·3	1·35	
,, 9	58·1	−4·8	0·51	
,, 16	60·8	−1·2	1·43	
,, 23	60·3	−0·5	1·20	
,, 30	59·5	−1·3	0·01	
Average	60·9	−1·1	Total 7·01	+2·01 inches

Wheat very much below an average; barley under an average; ts an extremely poor crop.

1866.

Week ending	Mean Temperature.	Difference from the Average of 41 Years ending 1867.	Inches of Rainfall.	Difference from the Average of 90 Years.
	Degrees.	Degrees.		
uly 4	62·0	-0·7	1·12	
, 11	61·3	-1·3	0·26	
, 18	65·1	+2·8	0·00	
, 25	57·1	-5·4	0·00	
gust 1	59·5	-2·9	0·66	
, 8	58·2	-4·7	0·72	
, 15	58·2	-3·8	0·69	
, 22	59·3	-1·5	0·15	
, 29	61·6	+0·8	0·03	
Average	62·0	-1·7	Total 4·63	-0·37 inches

Wheat below an average. Oats under average. Barley fair.

1867.

Week ending	Mean Temperature.	Difference from the Average of 41 Years ending 1867.	Inches of Rainfall.	Difference from the Average of 90 Years.
	Degrees.	Degrees.		
July 3	61·4	-1·3	0·42	
,, 10	59·2	-3·4	0·02	
,, 17	61·7	-0·6	1·22	
,, 24	60·0	-2·5	0·44	
,, 31	55·8	-6·6	1·90	
August 7	57·4	-5·5	0·71	
,, 14	65·4	+3·4	0·21	
,, 21	..	..	..	
,, 28	..	..	..	
Average			Total	

By the testimony of more than two hundred correspondents of the 'Agricultural Gazette' of August 17th, it appears that the wheat crop of 1867 is inferior to that of 1866, or that of 1865, in both of which years the yield was below an average. Barley is an average crop, but much of it of poor quality, and oats better than for the last two years. The information is condensed in the following table:—

		Number of Reports.			Percentage of Reports.		
	Year	1865.	1866.	1867.	1865.	1866.	1867.
Wheat ..	Under average ..	76	63	112	39·0	35·0	53·5
	Average	90	96	76	46·0	53·5	36·5
	Over average ..	29	21	21	15·0	11·5	10·0
	Total	195	180	209	100·0	100·0	100·0
Barley ..	Average	112	102	116			
	Over average ..	28	45	32			
	Under average ..	40	22	53			
	Total	180	169	201			
Oats ..	Average	27	84	105			
	Over average ..	2	29	46			
	Under average ..	154	60	48			
	Total	183	173	199			

What are the lessons deducible from our figures giving the temperature and cropping of twenty-two years? We see that nine years had a summer temperature above the average, and thirteen had a summer temperature below the average; but it

not appear that *precisely all* the harvests of the *plus* series better than usual, while all the harvests of the *minus* were worse than the average. The general law, however, ablished. The nine warm summers gave six wheat crops ore than average productiveness; whereas the thirteen cold ers gave only three "over average" wheat crops. On the ary, the nine warm summers gave only three harvests below verage; and the thirteen cold summers gave only three sts over an average. Moreover, none of the very best crops in cold summers, but in the very warmest; and again, of the very worst crops came in warm summer, but in the st. So far then the facts establish that, as a general rule, h mean temperature in July and August brings a good t crop, and a low mean summer temperature brings a ent wheat crop.

w if the modifying influences which spoiled three out of wheat crops in the warm years, and improved three out rteen wheat crops in the cold years, are such as were per-le and could be taken note of during the growth or ng and harvesting of those exceptional crops, it is very at that observers at the time could have properly valued a st by applying one general rule, and making necessary tions and allowances on account of the peculiarities in the ion of the crop or of the season. And to show that each the exceptional crops was produced under influences that penly apparent before the harvest was garnered, we will t the circumstances together before the reader's eye:—

YEARS of MORE than AVERAGE SUMMER TEMPERATURE.

Degrees *over* average.	Wheat Crop.	REMARKS.
Degrees.		
$2\frac{1}{2}$	Over average	
2	Over average	
$0\frac{1}{3}$	Over average	Ordinary heat; but rain less than the average.
$0\frac{2}{5}$	Over average	Moderate heat; harvest late.
$2\frac{3}{4}$	Under average	Crop spoiled by excessive rain, and a wet harvest time.
$0\frac{2}{3}$	Under average	Moderate heat; but a very successive quantity of rain.
$0\frac{3}{10}$	Over average	Less rain than usual.
$2\frac{7}{10}$	Very much over average	High temperature, and moderate rainfall.
$1\frac{9}{10}$	Under average	Moderate rainfall; but the crop was injured by excessively hot days, and too rapid ripening in July.

YEARS of LESS than AVERAGE SUMMER TEMPERATURE.

Year.	Degrees *under* average.	Wheat Crop.	REMARKS.
	Degrees.		
1848	$1\frac{1}{2}$	Under average	
1850	$1\frac{1}{3}$	Under average	
1853	$1\frac{1}{10}$	Under average	Excessive rain.
1854	1	Moderately good	A scanty rainfall.
1858	$0\frac{7}{10}$	Over average	Heat slightly below the average rainfall deficient, and harvest lat
1860	$4\frac{1}{2}$	Very much under average	Very chill summer, with excessiv
1861	$0\frac{4}{5}$	Under average	Slight deficiency of heat, and onl the usual rainfall; but the crop l excessively thin plant.
1862	$2\frac{1}{2}$	Under average	Moderate rain.
1863	$0\frac{2}{5}$	Very good	Slight deficiency of heat, but the su specially dry; only half the usua
1864		Under average	
1865	$1\frac{1}{10}$	Very much under average	Not a very great deficiency of he an excessive rainfall.
1866	$1\frac{7}{10}$	Under average	Moderate rainfall.
1867		Under average	Rainfall over an average. Thin p

We draw from these figures the conclusion that the ge character of a wheat harvest may always be estimate "average," or "over" or "under" average, according a mean temperature of July and August are greater or less th average, *provided that* due allowances are made for the favou or unfavourable condition of the plant after the vicissitud winter and spring, for the wetness or dryness of the summe harvest, for any special state of the weather at flowering for the lateness of the harvest or the shortness of the int between blooming and ripening, for mechanical damag storms, and for more or less than ordinary attacks of mi blights, and parasitic and insect enemies. All these condi peculiar to any one year are observable in that year; and ject to deductions and corrections thus easily obtained, the important condition of temperature is found an infallible to the comparative yielding capability of the English wheat in that year. Hence, we have in our hands a practically de strated power of ascertaining in September what will be the ral result of our actual thrashing during the winter and spri

Long Sutton, Lincolnshire, September, 1867.

VI.—*Mining Refuse considered Chemically in relation to Water-Meadows.* By Professor CHURCH, M.A., Royal Agricultural College, Cirencester.

THE question of the water supply of large towns has at length attracted the attention which its importance deserves, and there is a probability that some day our rivers will no longer be contaminated throughout their whole length by the inflow of human excreta. The proper disposal of town sewage is not, however, the only point connected with the water question in which agricultural and sanitary interests coincide. Another subject which merits the particular attention of the farmer, is the bearing upon our agricultural water supply of the increased amount and greater variety of industrial operations. Not only have factories and works of all kinds multiplied in number, and become colossal in size, but they have gathered more and more upon the banks of streams, rivers, and canals. This circumstance has arisen not only by reason of facility of carriage and convenience of trade, but because of the important part which water, both in the liquid state and as steam, plays in most technical processes. Thus it happens, in some districts more especially, that all the streams are hopelessly polluted. Chemical works and dye works, paper mills, and mines, and many other sources of injurious matters join in the fatal process. Each manufacture may yield a different kind of refuse, but these products have generally one character in common, they are alike destructive to animal and vegetable life. The results are seen in the thick and sluggish streams of our manufacturing centres; no fresh ripple plays upon their surfaces; an iridescent and putrid scum hides the horrors beneath; their blackened banks are bordered by no fresh grass or weeds, and their dark waters are tenantless. These are things that are, and ought not to be. Such cases seem hopeless; but there are other cases, occurring in districts still retaining their agricultural character, where the mischief, though less conspicuous, is still serious, but fortunately does admit of remedy and cure. I purpose describing in the present communication some circumstances connected with the irrigation of meadows by mine-water, a subject to which my attention has been especially directed during the present year. If my description prove somewhat prolix, an excuse may be found in the peculiar nature of the inquiry; for it was necessary to make the most minute search into the effects of the mining operations upon the water employed, in order to trace the injurious actions to their true source.

The particular case of injury to water-meadows which I have

submitted to careful investigation occurred in Devonshire. The same, or very similar conditions, are met with in most mining districts; one example will therefore serve the purpose of illustration.

It will be convenient to distribute the discussion of the present question under two heads; 1st, The nature and extent of the agricultural injury inflicted upon the meadows by the mine-waters; 2ndly, The causes of that injury, and the mode of their removal.

A stranger visiting the district in early spring would be at once struck by the appearance of the grass. Along either side of a long valley were a number of fields, many of which had been converted into "catch" meadows. Some of these meadows, but not many, were watered from small streams conducted into them from the hills just above and behind them; but, in most instances, the water of the main stream or river was utilised for this purpose. It was conducted from an upper level by means of a "leat" into one field after another. The grass in those meadows which were watered by uninjured streams was, at the time of my visit, growing with great luxuriance, the colour and height of the leaves being most conspicuous close to the main and subordinate watercourses. But where the river-water, contaminated by mining refuse, had been used, there the grass bordering the water courses had acquired an unhealthy yellow colour, and was generally less developed than that of the rest of the field. The injurious effect was clearly traceable to the water, and was greatest nearest to the main channels where the overflow was most considerable. Percolation through the soil, and commixture with purer streams, rendered the water of the river itself less and less harmful as its distance from the mines increased. Still, in the same valley, some miles below the source of contamination, the meadow grasses were seriously affected by the impurity of the water. Above the mines, on the contrary, every sign of a good water was present. The irrigated meadows were of a rich deep green, the edges of the watercourses being particularly luxuriant, while in the channel of the stream itself masses of rich water-weeds were to be seen. But at the very entrance of the first portion of refuse water contributed by a mine, the whole aspect of the pasture was changed. There was but little grass in the first water-meadow below this influx impurity, and what little there was showed a most sickly [illegible] By the side of the water channels the grass had actually [illegible] burnt up, "just as if it had been watered with [illegible] stream itself not a vestige of a water-weed [illegible] This [illegible] influence of the mine-water [illegible] conspicuously seen at the

xact point where the first influx of the poison took place. On he one hand, above the contamination, the weeds were bright and uxuriant; while, on the other hand, a yard further down, a stray ragment of a blackened weed might be seen here and there, but not a trace of a growing plant.

We have described in brief outline those aspects of the present question which would most readily strike a casual observer: we will now, however, examine a little more minutely into the precise nature of the agricultural depreciation of the land which this contamination causes. This depreciation is in part negative, in part positive. It is negative because the injurious character of the mine-water has led to its abandonment, in great measure, for the purposes of irrigation. Some of the meadows, therefore, which were most profitably treated as water-meadows, now no longer can be thus considered; while the weeds and the mosses which irrigation served to keep under have reappeared in great abundance to the detriment of the more valuable grasses. The depreciation is also positive, for there is now no early feed. Manure, not before wanted, has now to be applied, and the yield of grass per acre is variously estimated as worth less by from 30*s.* to 60*s.* per annum than formerly. The absence of early feed is of the most serious import, for it interferes with the whole system of the valley agriculture. To get any tolerable growth of grass, the manure which the water once brought at a very insignificant cost, has now to be replaced by valuable farmyard manure, and even this fails to effect the same purpose. The crop is late, and it is also a very light one.

It is difficult to account for the action of water in suppressing the growth of mosses, many of which delight in moisture. But it is probable that though dampness and stagnant moisture may suit them, quickly running streams and total immersion in water may effect their destruction.

The examination of the causes of the injuries which mine-waters inflict may now be discussed. In the particular case which we are recording, attention was directed not only to the substance dissolved in the water, but also to the suspended matters. Commencing from a point above all sources of contamination, analyses were made of the water itself, of the suspended particles, and of the sand from the bed of the stream. The water here was very pure, containing only 4·5 grains of dissolved matters per gallon. The matters in suspension were insignificant, and consisted of a little organic mud, and a trace of clay. The sand was free from the particular minerals which were detected lower down the stream. The great characteristics of the salts dissolved in the water, besides their small amount,

was the almost complete absence of sulphates, carbonate of lime being the predominant salt. A very different state of things was revealed by the analysis of the water pouring into the stream from the dressing-floors of the higher of the two mines in question. This water was not clear, although it had lost much of its original turbidity in the settling pits. The suspended matter here was collected on a filter paper, and when this paper was burned, the green flame due to copper was at once seen. The water itself contained not a trace of carbonates; the original carbonates having been turned into sulphates. Alumina, iron, copper, and manganese were all detected in this second sample of water, although none of those substances had been found in the first. But the total amount of solid matter in the water had but slightly increased in amount, though its nature had been altogether altered. It was now 5·4 grains per gallon instead of 4·5 grains.

The water flowing from the second mine was still more altered in character. It contained more than three times as much mineral matter as the original stream, namely 15·2 grains per gallon instead of 4·5 grains. This water also contained no carbonate, but it was rich in sulphates. Besides the copper present in the suspended matter of this water, it held in solution, chiefly as sulphates, alumina, iron, manganese, and cobalt. The manganese, reckoned as proto-sulphate, amounted to 1·38 grains per gallon. Its presence was apparent during the evaporation of the water, a dark brown film forming on the surface, and being finally left in brown rings in the dish as the liquid dried away. The poisonous character of proto-salts of iron with respect to vegetation has been long known, but the influence of similar compounds of manganese has not been examined. In studying this matter I found that plots of grass watered with exceedingly dilute solutions of proto-sulphate of manganese were soon affected, and contrasted most unfavourably in the course of some days with plots not so treated. As to the injurious influence of the other mineral salts found in the mine-water the evidence is less conclusive. The cobalt found is not likely to possess any very distinct influence on vegetable growth, unfavourable or the reverse; but I think we may conclude that sulphate of alumina is objectionable. For the debris of rocks containing but mere traces of this substance are usually barren, and where readily decomposed iron pyrites and silicate of alumina occur together, so the sulphate of alumina is formed, a marked characteristic of the locality is the poverty or complete absence of vegetation

[illegible] relatively small amount of

injurious matters found in these waters as discharged from the mines into the meadows is insufficient to explain the evident damage which occurs, it must be remembered that at the time of my examinations of the waters the impurities were probably at their minimum, for the mines were hardly working at all. There is another circumstance that may be urged. The method of irrigation adopted is something more than a mere watering of the meadows. For days together, during some months, the supply of poisoned water comes in contact with the plants; and under these conditions is continually bringing with it small but multiplied portions of undesirable constituents.

It will suffice to say, concerning the amount of injury inflicted by the mine-water, that it was not confined to the immediate neighbourhood of the mines, but extended two or three miles below them down the valley. This point was particularly investigated not only by an inquiry as to the water employed to irrigate these meadows, but in another way which I will now proceed to mention.

The matters in solution had been thoroughly examined, but it was found that, after all, the matters in suspension were the cause of most of the mischief. These matters invariably contained copper, iron, and sulphur; in fact, copper pyrites and iron pyrites; the mines being worked for the former mineral. By oxidation, which occurs partly during the dressing of the crushed ore, the insoluble sulphides of copper and iron were converted into the soluble sulphates of those metals, free sulphuric acid being formed simultaneously. Specimens of pure crystallised sulphate of copper were actually obtained from the walls below the dressing-floors of one of the mines, while the carbonate of lime in the mortar of the same walls had been in part turned into sulphate. The same change of carbonate into sulphates has been already alluded to in reference to the constituents of the water itself.

Atmospheric air and moisture rapidly cause the oxidation of copper and iron pyrites, when these minerals are in a finely divided state. The larger particles escaping from the settling pits find their way into the stream, and, resisting oxidation for a considerable period, may be traced in the sand of the river-bed some miles below the mines. Some of the particles, not so coarse, continue suspended in the water owing to the rapidity of the current, but finally become deposited upon the land, and on the grass of the water-meadows irrigated by the stream. A good idea of the amount of copper ore which may be found in the bed of the stream, a long way below the mines, may be formed from the following data. Some sand collected from the river-

bed, at a distance of more than 1½ miles from the inflow of the mineral refuse, contained 8·3 grains of metallic copper per pound. Another specimen, from a lower bend of the river, contained 20·7 grains of metallic copper per pound; while even the mud which settled on the grass and weeds on one of the most distant water-meadows, contained when dry more than 10 grains of metallic copper per pound. In order to prove whether or no finely divided sulphides of copper and iron produce a deleterious effect on vegetation, some of the ore from the mine in question was ground to a fine powder, and grass plots were watered with pondwater in which some of this powder had been suspended. Before long, yellow spots and stains appeared upon the leaves of the grass, as the oxidation of the sulphides proceeded—an effect which was identical with that observed in the irrigated meadows. Agricultural chemistry can furnish an explanation of this phenomenon. The active procees of oxidation going on in a soil where putrescent organic matter, or a proto-salt of iron, &c. is present, interferes with the functions of vegetable nutrition. The plant lives upon oxidized food, upon the most highly oxidized compounds of sulphur, nitrogen, phosphorus, &c., and any action which tends to reduce these compounds to a lower state of oxidation is inimical to healthy vegetation. The influence of these copper and iron sulphides present in suspension in the mine-waters is, in part at least, of this character. But its bad influence is more extensive, for not only is the oxidizing process which these matters are continually undergoing an injurious one to plant life, but the products formed are also in themselves injurious. This aspect of the subject was presented to me in a very marked manner during some recent experiments on the poisoning of fish in one of the salmon rivers of North Wales. Here the mines which caused the injury to the water being lead mines, it was naturally concluded that the salmon were poisoned by lead compounds. Analyses of the poisoned fish did indeed detect the presence of lead and also of copper in the heart, arterial bulb and liver of the animals, but the suddenness with which the fish died immediately after the waste waters of the mines had found their way into the river did not permit me to suppose that the time had been sufficient to allow of the idea being entertained that an absorption of mineral poisons had in reality taken place. The waste water of the mines was further examined, as it flowed into the river, and was found to be strongly acid! Sulphuric acid had been formed by the oxidation of the iron and copper pyrites which accompany the lead ore (galena or sulphide of lead) and this sulphuric acid was still in excess, after having been in part employed in transforming

.rbonates of the water into sulphates. These facts, derived the Welsh inquiry, and those obtained from the Devon- investigation point at once to the nature and also to the ılty of avoiding the injuries inflicted by mine refuse. We say a few words on this subject in concluding this imperfect : of an important though generally neglected subject.

: have seen that the evil effects of which we have spoken not only from matters in suspension, but also from matters ution. The former are in part removed by the methods of ıing" generally adopted in practice, but these methods t be made more perfect. Settling-pits are alone insuffi- ; they must be combined, in order to be really effective, such processes of filtration as are adapted to the peculiar ıcies of each case. Peat, for example, has been occasion- sed with success for effecting an adequate filtration of waters ly nearly freed from suspended matters by the ordinary ɔd. Here a horizontal filter, in the form of a porous bed : last of the settling-pits, is more useful than a vertical at the place of outflow. As to the purification of the water injurious dissolved matters, lime and carbonate of lime may nerally relied on. Chalk or limestone, where obtainable ıly, may be used as a final filter after the mechanical filters done their work. Conduits filled with small fragments of alcareous rock afford an excellent means of bringing the ring action of carbonate of lime to bear upon the contamina- ıf the water; at the same time they are easily emptied and d when the material has become inactive. It is seldom sary to replace all the material, that part of it through which npure water first percolates requiring, of course, more fre- renewal. In some cases where ordinary carbonate of lime y of its common forms is not thoroughly effective, a small ity of burnt lime, now and then thrown in, completes the

The action between the impurities and the calcareous ınces is generally one of the following kind. The injurious lic sulphates of the water are converted into sulphate of while the harmless oxides or carbonates thus formed are ıted at the same time. If, as often happens, the copper ved in a mine-water has to be extracted, this must be done, : usual way with scrap-iron, before the filtration through

VII.—*The Conditions which influence the Spread of Contagious Diseases among Animals, with Remarks on the Means of Prevention.* By PROFESSOR BROWN, M.R.C.V.S., Inspector to the Veterinary Department of the Privy Council, and Veterinary Inspector to the Bath and West of England Society.

THE subject of contagious diseases of amimals has at no period in the history of Agriculture excited more attention than during the last two years, distinguished as they have been by the prevalence of a malignant and eminently infectious malady among the cattle of the country. The experience which has been gained, not without great sacrifices, will not have been too dearly purchased if all the lessons which it teaches be well learned, and in the future carefully applied. It would have been a triumph for science if the experiments which were instituted had resulted in the discovery of a specific; but it will be a still grander achievement if, based upon the teachings of the past, a method shall be devised for the prevention of those malignant affections which medicine is powerless to cure. That all has been gained that might have been from the opportunities which have been recently afforded cannot be affirmed. In the midst of a general alarm it may be doubted if in the multitude of councillors there was always the important element, Wisdom. A great deal that might have been beneficially omitted was sedulously, and with good intention, performed, and many problems that required solution were left for future investigators to elucidate. But under the most unfavourable aspect in which the subject can be viewed, it cannot fail to be perceived that many important experiments have been tried, some of them unwittingly, and that the whole results, if carefully examined and wisely arranged, will definitely indicate a course of action which, if consistently pur-ued, will prevent the cattle-plague being regarded as an unmixed calamity.

Much difference of opinion at present exists upon fundamental questions. On one side it is urged that free trade in cattle is detrimental to the stock-breeding interests of this country, and that although a temporary inconvenience would result from the cessation of importations of foreign cattle, the home producers would soon restore the balance, and the necessary supply of meat as alleged might be obtained without the introduction of living animals into the country at all. These propositions are by an opposite party denied, and the disaster of a meat famine is by them graphically threatened as the consequence of the exclusion [illegible] the most

rofound and practical acquaintance with the subject it is admitted that the question of the supply of meat for a constantly ncreasing and socially advancing population, is not free from ntricate complications, notwithstanding the assertions of illnformed speculators, whose generalities are advanced with the nost perfect confidence, and by whom plans impossible to be executed are suggested; each one being recommended by its originator as a panacea for all existing evils, while in effect it contains within itself the evidence of its impracticability, discoverable either by an examination of its details, or becoming apparent at once under the test of experiment.

Neither those who oppose the importation of live stock as mischievous and unnecessary, nor those who unconditionally support the system as absolutely indispensable to meet the wants of the country, appear to question the fact that diseases which have their origin in other lands are brought to our shores by cattle and sheep from abroad; and both parties would probably discuss upon common grounds the best means of obtaining a supply of animal food to meet a demand which appears to be almost insatiable, without inflicting injury upon the producers of home-bred stock, by transmitting to the flocks and herds of this country diseases from which they are naturally exempt in their native pastures, but to which they easily succumb when the virus is introduced among them. That it is possible to limit the extension of infectious maladies has been proved by experiment, but it has yet to be determined to what extent restrictive measures can be established on a permanent basis, and how far they may be made to include the infectious diseases which are now almost naturalised in various parts of the United Kingdom. The solution of these questions necessitates the consideration of several important points referring to the origin, nature, and mode of propagation of contagious affections.

GENERAL CHARACTERISTICS OF INFECTIOUS DISEASES.

Certain maladies are distinguished from all others by the quality of communicability. Through the medium of products which are developed during the course of the disease, they can be conveyed to other animals at a distance, as well as to those which are in immediate contact. In a variety of ways the virus extends its centres of action. Volatile emanations from the diseased animal may be carried by the atmosphere. Morbid secretions, which are less easily diffused, may be conveyed to healthy animals by direct or indirect agencies. Different diseases vary much as to the facility with which they may be propagated. A glandered horse may remain for months unsuspected in an esta-

blishment where other horses are kept without the occurrence of another attack. It appears that in this disease actual and gross contact of the virus with a mucous membrane or an abraded surface is necessary to its production in another animal. If this be avoided—and without great care the risk is imminent—no extension of the disease occurs. Cattle-plague, on the other hand, is so much more readily communicated, that the mere passage of healthy oxen through a locality where the disease exists is dangerous to them; and the exposure to the atmosphere of a shed in which diseased cattle have recently stood is certain to be followed by the development of the malady. In man mental impressions frequently acquire a marvellous ascendency over the organism, and under their influence it is undoubtedly the case that diseases are communicated by very insignificant agencies. In the lower animals, however, nervous susceptibilities do not to the same extent modify the action of the virus, and it is not often requisite to decide how much of an effect is due to imagination, and how much to reality. Not only is it the case that the property of infection is possessed in various degrees by different infectious diseases, but it is also true that the fatality which distinguishes these maladies is not always in direct relation to the activity of the infection. No one of the contagious diseases is more readily communicated than the mouth-and-foot disease of cattle, and ordinarily no affection is less fatal; while pleuro-pneumonia, which certainly is infectious in a much less degree, is infinitely more destructive.

Infectious maladies are always characterised by special signs which distinguish them from other infectious maladies, but not always from other maladies which are not infectious. It is, for example, correct to say that no other known infectious disease possesses the characters of cattle-plague, but it is not correct to say that no other non-infectious disease possesses the characters of cattle-plague; because it is certain that affections occur in the ox tribe resembling cattle-plague so closely that the only positive distinction is the absence of the infectious property. The special characters of an infectious disease do not always manifest themselves in every animal which is attacked; on the contrary, it is often necessary to examine several instances of the affection before all the signs can be detected. The non-existence of certain appearances which are ordinarily indicative of a disease, do not prove it to be absent, nor does the existence of some of the usual distinctive signs necessarily prove the malady to be present. The infectious quality is in itself a distinctive character of infectious diseases. Symptoms and lesions which belong to certain maladies are liable to variation, or they may be imperfectly defined during the course of infection, or distinct from, and entirely

independent of, pathological phenomena. Proofs of the infectious nature of a disease do not always present themselves to the view of a superficial observer, nor do the apparently most palpable indications of infection always lead to a correct conclusion. It is frequently necessary to reject as altogether fallacious much that at first seems to be positive proof, and to accept instead, facts which have previously escaped observation or remark. It is not, for example, by the recognition of special symptoms and the detection of morbid changes in the organism that the existence of an infectious disease can be positively and without possibility of error determined. Exceptional instances undoubtedly occur wherein the signs of a known infectious malady are so perfectly developed that, to the scientific pathologist, the evidence of the presence of the disease is complete; but irrespective of the fact that a profound, minute, and extensive acquaintance with normal and morbid anatomy is required to enable an investigator to assert that certain lesions relate only to one disease, it must not be forgotten that complications may arise and render the indications obscure, and that the influence of new conditions may produce changes which were not anticipated, and make that common to many which was at one period confined to a single disease.

For these reasons it is imperative that the question of the existence of a contagious disease among the stock of a country or district should not be hastily affirmed. What may be called the obvious or popular view of the matter is most likely to be erroneous. A definite conclusion can be arrived at only by a critical examination of all the conditions which obtain in the locality where the malady prevails. In every instance where the inquiry relates to an infectious disease, the evidence which has direct reference to the infectious quality is of more value and less likely to lead to error than the testimony afforded by the symptoms of the disease or the morbid changes which have taken place in the organism in consequence of its ravages. Indeed, it may be taken as an axiom in pathology that no combination of symptoms and morbid lesions indicates *à priori* that the malady is contagious.

When a disease possessing certain definite characters prevails among a number of animals in a district, and particularly if the affection was previously unknown in the locality, it may be predicated of it with certainty that it will be at once and without hesitation deemed an infectious disease by the majority of persons who are aware of the circumstance of its general prevalence. It would not be necessary to combat this universal prejudice, were it not that the opinions based upon such evidence are always supported by an appeal to facts. An examination of

the argument will prove in the most satisfactory manner the fallacy of the inference—that because a malady attacks a number of animals it is therefore infectious. Some forms of disease prevail in particular localities and during special atmospheric conditions; they attack a large number of animals in the locality and after a time disappear, to recur whenever the necessary conditions are established. Such affections do not extend beyond the district where the conditions exist, unless the conditions also extend. When the disease depends upon or is influenced by atmospheric changes, it may prevail over a large extent of country at once, and animals which are brought into the situation where the affection is rife become its victims. Still the proof of infection is wanting. It is true that precisely the same thing would happen in reference to contagious maladies: healthy animals being brought into the places where those infectious diseases prevail would be likely to become themselves infected, but in a manner totally different. In the case of the non-infectious disease, they would suffer in consequence of being placed under the influence of the local causes, and irrespective of their association with diseased animals, and even at a distance from them; but the communication of an infectious disease only results from contact, direct or indirect, and it occurs equally whether the contact takes place in the district where the affection prevails, or at any part remote from it. If no contact is permitted, if the healthy animals are absolutely isolated, it is a fact of observation that they may remain free even while the disease is raging around them. It is possible to surround an infected district with a barrier over which the infection shall not pass, and outside which animals shall enjoy a perfect immunity. No barrier, however, can be erected to limit the extension of diseases which depend upon local conditions of soil, herbage, water, or atmosphere. So far as they reach, the effects are apparent upon all that are susceptible to their influence. In order to arrest their development, nothing short of the removal of the animals to other situations will suffice. Palliative measures may modify the severity of the attack, but the prevention is only to be attained by a total change in the conditions under which the animals are placed.

A well-known disease of sheep—rot, or bane—furnishes a complete illustration of this position; because no suspicion of infection can be admitted in reference to this malady, the nature and origin of which are perfectly understood. In some situations the conditions which determine the existence of the disease are always present and sheep in those situations invariably suffer; but they do not acquire the power of carrying the affection to other [illegible] distant parts when they are removed from the posi-

on in which it originates. Under extraordinary atmospheric influences a large proportion of the feeding-ground over countries which are ordinarily perfectly healthy may become capable of producing the disease, and in such seasons rot assumes an epizootic character, and prevails to an extraordinary extent. Nevertheless, the fact of its general existence does not arouse any suspicion of infection, because the causes are recognised, and there is no mystery associated with their action; while evidence of a precisely similar kind in respect to a disease whose nature is not so well understood, or the causes of which are not apparent, is admitted as proof of infection without further question.

Contagious diseases not only extend to animals which are in the immediate locality of the original outbreak, but they also advance to other localities, irrespective of soil or herbage, or atmospheric changes. They appear wherever a diseased animal, or part of such animal, comes in contact with healthy ones, or wherever the virus is carried, directly or indirectly, passing over many carefully-isolated animals in the infected district and attacking others at a distance that are left unprotected.

Infectious diseases rarely attack a large number of animals at the commencement. If the discovery of the malady follows immediately upon its outbreak, it will be ascertained that a few victims were first selected, and from these the infection extended to others until the whole, or nearly the whole, of those which were exposed to the influence of the virus became affected. Attacks, generally, are observed to follow each other at regular intervals; and as the malady extends the intervals become shorter and the cases more numerous. In the first instance, it is probable that one or two animals only would became infected; from these the poison would be transmitted to three or four others, and again from each of these to several others; and in this way the number of diseased animals may be expected to increase day by day, presuming that the disease is allowed to run its course unchecked.

Non-contagious epizoötic diseases never extend among a herd or flock in this regular way. Instead, their progress appears to be in opposition to all rule. There may be several animals suddenly attacked, and then the disease may suddenly cease, only to reappear after a short interval. Sometimes the weakest animals are first attacked, and at others those in the best condition fall. In a herd of forty, one or two may be fatally affected and the rest escape; or the malady may rapidly or at irregular periods carry off one-half and spare the rest. No uniform characteristic distinguishes these maladies, except their fatality; but, notwithstanding the varied pathological changes which are observed to exist in the animals which have died from the malady, there is

always evidence of a depraved condition of the blood; and it is besides invariably observed that wherever these maladies occur there are peculiar circumstances of soil, herbage, and atmospheric changes. Much remains to be learned respecting the origin of the so-called blood-diseases of animals, but in reference to the fact of their non-contagious nature the evidence is clear and incontrovertible.

THE INFECTING GERM (CONTAGIUM).

"Contagious" and "infectious" are terms in common use in speaking and writing upon those maladies which possess what has been previously designated the quality of communicatibility. In the employment of these terms, there was at one period an accepted difference of meaning, which is by some authorities still preserved. The word contagious was used when it was intended to refer to a malady which, like glanders in the horse, is only communicable through the medium of positive and gross contact with the virus which exists in the discharged matter; while infectious was confined in its application to diseases which were propagated in a more subtile manner, and without actual, or at least perceptible contact. Some maladies again being capable of transmission in both ways, were designated infectious and contagious.

At present, by general consent, and in recognition of the fact that our knowledge of the subject is not yet sufficiently exact to permit a precise definition of the meaning of the two words, they are used interchangably. The property or quality to which they refer may be expressed by the word "Contagium," which is proposed as a substitute for the term infecting germ, &c. It is further necessary to guard against the erroneous impressions which may be conveyed by the use of certain other terms, such as germ, virus, and animal poison, which are employed to represent the contagious property. No particles or germs possessing special characters have yet been demonstrated to exist in the products of infectious diseases. The fact of the possession of the peculiar property may be asserted; but the presence of any unusual form of matter in which the property resides may be denied, because demonstration is wanting. Upon logical grounds it does not appear to be necessary to the explanation of all or any of the phenomena of contagious maladies, that the existence of any peculiar kind of germ or particle should be assumed. If in the course of investigations upon fluids and solids of infected animals certain new elements had been discovered, it would be a fair inference that they were related to the infectious quality of the disease; but as no new elements

have been observed, even by the aid of the recently constructed objectives of high magnifying power, it seems to be unjustifiable to assert, even by implication, the existence of particles or germs, of the presence of which there is no evidence. All that is capable of demonstration in reference to the virus of infectious diseases, is that products taken from an infected subject possesses the power of producing in another animal the identical disease which exists in the body of the animal from which the product was taken. A small quantity of a perfectly clear limpid fluid, the serum of blood of an infected animal, shall be introduced into the circulation of a healthy animal; no immediate effects follow, the beast remains for some days without affording any signs of the change which is going on in his organism. At the termination of a definite period signs of derangement are apparent, these are added to day by day, and at length the specialities of a certain known infectious disease are recognised, and it is found that every drop of the animal's blood has acquired the property which was possessed by the one or two drops of serum which were introduced into the system a few days before. The same experiment, however, often repeated, is attended with the same results, and thus a particle of virus multiplied by successive animal systems will suffice for the ultimate infection of an entire race. Among the speculations that have been indulged in by thinkers upon the subject of infection, the fermentation theory is the most ingenious and least tenable. It is well known that the ordinary ferment, yeast, consists of vegetable germs, which multiply by the exogenous process with exceeding rapidity during fermentation, and consequently from a minute quantity of the ferment, an abundant product of the same kind of matter results. From a single cell of the yeast plant, which possesses the property of inducing fermentation, an indefinite number of cells, all possessing the same property, will be developed. A comparison between the fermentative process and the development of an infectious disease may be so stated as to appear real, but, in fact, there is nothing which can be correctly asserted of the one which applies to the other. A tyro in microscopic investigation may demonstrate the growth of the yeast plant, but the most skilled observers have failed to detect any analogous developmental action in the products of an infectious malady, and this circumstance in itself is sufficient to show that the fermentative process and the progress of an infectious malady are not analogous in their nature or results. It is certain that during the period which elapses between the time of the introduction of the contagium into the animal system, and the manifestation of the disease by outward signs, the property which belongs to the contagium is imparted to the

constituents of the organism of the inoculated animal; and in the attempt to explain this fact, it has been assumed that a certain material in the blood is capable of being converted into the contagium. Against the hypothesis, for it amounts to nothing more, the same thing may be urged that was advanced in opposition to the idea of fermentation, the absence of any evidence of the existence in the blood of a material which is susceptible of being changed into some other material during the development of the disease. It may also be said of this speculation as of the other, that it is not necessary to explain the phenomena. If it be admitted that the products of certain diseases possess the property of inducing the same disease in a healthy animal, and, in the act of so doing, of imparting to the constituents of that animal's body the same property, that of inducing the same disease in other animals, no more is required for the purpose of explanation; and the necessity is avoided of attempting to account for the effects which are observed, by referring them to the action of a particular constituent (ferment), which cannot be proved to exist, upon a peculiar material in the blood, also incapable of demonstration by chemistry or microscopy, which is presumed to undergo a change, the nature of which is also unknown. When, in reference to an abstract question, all the means of analysis at command do not afford any additional aid, and it becomes necessary to assume what cannot be proved, it is at least desirable not to multiply speculations unnecessarily; and in face of the fact that the most minute examination of the products of infectious diseases fails to indicate any elements which do not also exist in the healthy organism, it is scarcely reasonable to talk of the growth of the infectious matter, or of the presence of a material in the blood which undergoes conversion into some new form under the influence of the disease.

It appears to be an essential condition for the development of an infectious disease that there should be in the animal system a certain susceptibility to the influence of the contagium. Nothing is known of the nature of this condition, but it has a definite relation to special diseases, and ceases to exist when once the disease has run its course. Thus, in the majority of cases, an animal is only liable to one attack of an infectious malady during its life-time: second attacks do happen, but generally after unusually long periods; in most instances the animal's system resists the most persevering attempts to induce the malady a second time, either by exposure or by inoculation, or both combined.

Probably it is a result of the relation which exists between an infectious property which has the power to act, and the

quality of susceptibility which disposes the animal to be acted upon, that infectious diseases manifest special affinities, affecting certain kinds of animals, and showing no tendency to attack others. Sometimes the action of the contagium is confined to one species of animal, in other instances it extends to the entire family. The virus of sheep-pox, so active in the system of the sheep, produces no effect upon the system of an ox or a man; nor does the eminently contagious cattle-plague extend to man, or to the horse, although it takes a wide range among the ruminants. Glanders, which is so decidedly contagious among horses, is also capable of being communicated to man; but it does not appear that any infectious diseases of man can be transmitted to the lower animals. Without direct experiment, however, the question of the possibility of the extension of any infectious malady from animals of one family or species to those of another cannot be decided. There is no recognised law which so far regulates the diffusion of these affections as to permit a positive statement to be made in the absence of direct evidence, which can only refer to each separate affection: for example, if it be capable of proof that sheep-pox, which is an infectious disease among sheep, cannot be transmitted to the ox, it does not, therefore, follow that the cattle plague, a contagious disease of the ox, cannot be conveyed from the ox to the sheep, no more than it is necessarily the case that because cow-pox can be conveyed from the cow to man, the human being is therefore liable to the other infectious maladies which attack the bovine family. This *reductio ad absurdum*, would not have been suggested, were it not that the argument is constantly advanced by those who prefer general to exact reasoning. It may be accepted as a truth that contagious diseases only manifest a particular tendency to spread among animals of the same species, and in a less degree among the individuals of the same family; but as an exceptional circumstance, it is also true that they occasionally affect animals which are not of the same genus. Among animals which are obnoxious to the affection there is observed to be considerable difference in the degree of susceptibility to the influence of the virus; and it is not improbable that the susceptibility regulates the virulence of the attack.

Very rarely does an animal indicate an absence of the susceptible condition; such instances, however, have occasionally come under observation; and during the progress of the cattle-plague several cows in various parts of the country escaped without the slightest appearance of illness, although standing in the midst of a herd in which the plague was raging. The ordeal has been passed by some of these non-susceptible animals twice or thrice with the same impunity. Ordinarily in

a country where the plague was an occasional visitant, such instances would be immediately explained, on the ground of a previous attack; but several of the animals that have stood through two or three attacks of cattle-plague were home-bred stock, in reference to which the suspicion of a previous attack could not then be entertained.

The origin of the contagium is not less obscure than its nature, so far as it can be determined from the evidence which exists. Infectious diseases in this country never arise spontaneously; no combination of conditions suffices to produce them. In some instances they are known to be indigenous to certain localities, and to extend from them by virtue of their infectious character whenever animals are removed from those situations, and driven through the country to supply marching armies, or to meet the requirements of an increasing commerce. In this way the cultivation of the arts of war and peace may be made accidentally instrumental to the propagation of infectious maladies. On our own pastures in different parts of the kingdom diseases which are destructive to the animals they attack frequently occur, but in no case are they infectious, while many of the maladies which originate in distant countries are characterised by the possession of the contagious quality.

An infectious malady when once developed may be propagated in a variety of ways more or less direct, depending on the activity of the contagium. The most certain and direct method of communicating the infection is by permitting the association of the diseased animals with the healthy; and whether this is done intentionally on the farm, or fortuitously in fairs and markets, is a matter of no consequence so far as the results are concerned. Short of the actual association of infected animals with healthy stock, the contagion may be received during the time that animals are being driven in the vicinity of diseased animals, or along paths which they have traversed, and which have therefore been contaminated by the excretions and discharges. The less direct means of conveying the virus may also be effectual. The passage of individuals from diseased to healthy stock has certainly in more than one authenticated instance caused the transmission of the disease, and there is no reason to doubt that animals not themselves susceptible to the malady may carry it to others which are.

The more volatile the contagium the more subtile is its action, and the greater is the risk of the propagation of the disease, and by seemingly inadequate means. Many experiments have shown how large a quantity of a morbid product is required to produce disease, but none have been directed to discovering how little will suffice, and the elucidation of this point is

the more necessary as so many cases arise where no direct or indirect communication can be traced, but where, if all the methods of transmission were known, it might be easy to account for the occurrence. During former outbreaks of sheep-pox there is good reason to believe that starlings, in their search for parasites in the fleeces of infected sheep, had their beaks charged with the virus from some of the pustules, and if they proceeded from the sick to healthy sheep at a short distance, it is not at all improbable that they would convey to them the infection. In a like manner flies, clustering round an animal afflicted with plague, and becoming covered with the discharge from ears and nostrils, might, if they by chance passed directly to a healthy subject, inoculate it with the matter so conveyed. Hounds and horses crossing an infected district where diseased animals are or have recently been in the fields, and getting their feet contaminated with the manure, might easily carry it to other districts. The conveyance of the manure from infected animals to healthy localities is another possible method of conveying the disease, and still further the infection may be carried in parts of animals as the hides, hoofs, meat, or offal. It must be admitted, however, that the probability of the disease being propagated in these ways is very remote, principally for the reason that manure, hides, hoofs, flesh, and offal of infected animals are not in the ordinary course of things likely to come in contact with stock. Manure for example is usually ploughed in, or if used for dressing pasture-land is put on when animals are not grazing there. Meat, hides, and other parts of animals are generally taken directly to localities where cattle are not likely to be found; to butcher's-shops, tan-yards, glue-makers, tripe-dressers, and to other establishments where the several parts are utilised, and where the chances are against their doing any mischief. Were it not for the circumstance that such portions of diseased animals are so disposed of as to be kept remote from healthy animals, not as a matter of precaution, but in the ordinary course of trade, they would constitute a decided and very unmanageable source of infection. Another cause of the spread of an infectious malady is the introduction of new stock into localities where diseased animals have previously stood. If the cleaning of a shed has not been well done, and masses of dung, manure, or discharges have been left unremoved from the floor or walls they may become again moistened, and by contact with the healthy animals induce the disease. How long the products of contagious diseases retain their activity has not yet been determined. It has been stated, on the authority of continental investigators, that cattle-plague has resulted from inoculation with virus eleven months old. Experiments recently made with

cattle-plague matter, ten years, two years, and one year old, gave negative results; the inquiry, however, on this subject is not completed, but there can be no doubt that the activity of the virus remains for some time, providing no means have been adopted for the purpose of neutralising its properties.

PREVENTION OF THE SPREAD OF CONTAGIOUS DISEASES AMONG ANIMALS.

With the knowledge of the conditions which influence the spread of contagious diseases among animals, it is not difficult to propose a system of prevention, but it is almost impossible to suggest a plan that shall be effectual in arresting the progress of an infectious malady, and at the same time shall permit the free movement of cattle and leave the trade of the country unfettered with restrictions. There are two distinct methods of dealing with contagious diseases of foreign origin; one plan refers to the method of excluding them from the country by preventing the entrance of the animals which are likely to bring them, and the other relates to the arrestation of the malady after it has obtained an entrance, and is extending among the home-bred stock. It is obvious that the two systems are quite distinct. First, the plan of exclusion requires to be considered. The object of the importation of foreign cattle being mainly to increase the supply of meat, it is an apparently simple thing to arrange for transmitting the dead meat instead of the live cattle. If the animals were slaughtered on the other side of the water the amount of security would be greater than if they were slaughtered at the ports of entry, because all danger from infected hides, blood, and manure would be avoided, but either plan promises greater security than the importation and subsequent free movement of live cattle. The plan of slaughtering within a limited area at the port of entry is now on its trial, and it remains to be seen how far the import trade will be interfered with, and what effect the system will have upon the price of meat. It is certain that whether the animals are killed here or abroad, a large quantity of meat on certain occasions will be spoiled, and a considerable part of the available offal, which will not bear packing and carriage, will on occasions be lost to the poor consumer. There is also a great difficulty in regulating the supply according to the demand, and in consequence it will frequently happen that there will be an excess when the demand is diminished, and a deficiency, depending upon weather and other causes, precisely at the time when an abundance is necessary. Such matters of detail, however, do not particularly interest the public as consumers, or the farmer as a producer, although they are matters of serious importance to the

trader. As particulars of commerce they will in all probability find their level, and in time those who are most interested will accommodate themselves to the new state of things. The important question for the agriculturist is,—What amount of security is gained by the arrangement? and upon this point it is necessary to suggest that an excess of confidence may lead to disastrous results, the security depending entirely upon the absence of disease among the imported animals. If infected beasts are landed in our country their confinement to a restricted area will not absolutely prevent the propagation of disease: persons who are engaged about foreign stock, butchers who examine them with a view to purchase, and salesmen to whom they are consigned, will all of them be similarly occupied in the markets for English stock, and the disease may be thus conveyed to these animals. The risk of infection is much lessened by the system of slaughtering at the ports, but that absolute security is thereby obtained does not appear.

In order to arrest the progress of an infectious disease that already prevails among the stock of a country, a more comprehensive system of action must be arranged, and, if success be desired, temporary inconvenience must be submitted to.

The treatment of the diseased animals first requires consideration, and before it is decided to adopt any remedial measures it is necessary to fairly estimate the probable results. If the disease is a fatal one, like cattle-plague, there is to be taken into account the mischief that will follow the extension of the malady from the diseased to healthy stock, if not by actual contact which may perhaps be provided against, at least by the indirect conveyance of the contagium by men, animals, manure, and fodder. Diseases of animals are treated, not because of the importance of the life of the individual, but with regard to the money value, and if it can be shown that by the destruction of the patient a clear gain results, it is only an act of common sense to prefer those means which promise or have been proved to effect the greatest amount of good. During the ravages of the cattle-plague it was observed that the increase of the number of attacks was in direct proportion to the number of sick animals which were placed under treatment, and that so soon as the system of slaughtering was put into force the progress of the disease was rapidly arrested. Against the system of slaughtering it is urged that science is opposed to a plan so barbarous and unphilosophical; but however interesting it may be to investigate an infectious disease for purely scientific reasons and to test the efficacy of medicine on the ground of humanity, it must be admitted that the welfare of the country is of more importance than the establishment of a principle, and if experience proves that to kill is more economical than to cure,

sensible people will adopt that course, in spite of all the sensational declamation that may be directed against their proceedings. Were it the case that remedies for a malignant and infectious malady really existed and that their curative action was certain in its effects, it would still be a question how far the damage which would result to healthy stock from the infected animals being kept alive—active producers of the contagium—should be allowed to weigh against the use even of a specific; but when the results of treatment have been uniformly unsatisfactory, no justification can be urged in defence of a system which is nearly certain to inflict injury upon the neighbourhood.

The grand aim of veterinary science should be the preservation of the health of the stock of the country, and the cure of disease is one means to this end; but if circumstances arise under which the slaughter of the infected beast is a more rapid, safe, and certain method of attaining the end, veterinary science fails in its service to the country if it opposes a system that has the great merit of success to recommend it in favour of one which is distinguished by invariable failure. Whether the destruction of the diseased animals should be followed by the slaughter of all those that have been in contact with them, or in any position where it is likely they would have received the infection, will depend upon a variety of circumstances. At the commencement of an outbreak of a virulent disease, and where few animals are exposed to the influence of the contagium, the immediate slaughter and complete destruction by burying under quick-lime, or immersion in sulphuric acid, or burning with tar, is the course which promises the best results. This plan was adopted in France and Ireland, and both countries escaped with trifling loss. The practice of slaughtering and dressing the presumedly healthy animals, many of which are infected, is undoubtedly attended with great danger of the spread of the disease by means of the men who are engaged n slaughtering and skinning the animals, by the flesh which is conveyed along roads in vans and carts, by the hides, offal, and nanure. When the disease has extended over a country, the arge number of animals exposed to the infection makes it impossible to dispose of all of them, and in such case the division of every herd into as many distinct lots as the farm will accommodate is the most satisfactory way of meeting the difficulty, as each ot can be treated as a small herd; and in the event of the disease appearing among one division, the animals comprising it should be immediately destroyed. By the early adoption of this plan a considerable part of a large herd may be saved. Immediate separation of the sick from the healthy is a necessary proceeding n all cases where the whole of the exposed animals are not [illegible] is a further means of opposing the spread of the

nfection, various disinfectants may be employed about the premises and in the sheds where the animals are kept. Sawdust mixed with carbolic acid may conveniently be scattered on the floors of sheds, and quick-lime may be daily thrown on the paths which conduct to the buildings or pastures where cattle are kept; and for the purpose of purifying sheds, after a complete cleansing by means of warm water and soda, fumigation with sulphur may be used, and subsequently a solution of carbolic acid may be syringed over the walls and woodwork; and, lastly, the floors should be covered with quick-lime.

Isolation of the healthy stock is the most perfect system of prevention, meaning not merely the removal of the animals from the immediate locality of the disease, but the entire cutting off of all communication, the establishment of distinct arrangements for feeding, watering, and milking carried out so completely that the animals should be virtually in another district; no persons should enter the sheds save those who are deputed to that sole duty, and they should not be permitted to enter other parts of the farm or to approach infected animals or places. It is possible to so completely isolate cattle on a farm where the disease is raging that no extension of the infection to them shall occur: it has been done, but only by unremitting watchfulness on the part of those who are interested in the result. As generally understood, isolation means the simple removal of healthy animals from the immediate neighbourhood of the disease, and the adoption in a hap-hazard way of any precautions which may be suggested by sympathizing friends, who probably may evidence in a practical manner the interest they feel by an inspection of the stock that has yet escaped the infection, and afterwards congratulate the owner on their appearance as compared with his neighbours' cattle which are suffering from the prevailing malady, and which have but recently been the objects of discriminating attention on the part of the same persons who would very likely be startled if the idea of any danger arising from their presence among the healthy animals were presented to their minds. Only as the result of long and varied observation does it become possible to realise the extent of the indifference to consequences which marks the proceedings not only of owners of stock, but of all who are concerned in their management during the existence of an infectious malady. To judge from appearances, there is a wide-spread scepticism as to the existence of the infectious quality, as the term is understood by scientific men. Popularly the idea of contagion is associated with the mysterious, and the distinction which really exists between an epizootic disease, like splenic apoplexy, and an infectious malady, like cattle-plague, is not perceived, or rather is denied, and the tendency is to endure instead of struggling to escape. If the conditions which influence the spread of infection were clearly

appreciated—if it were universally comprehended that before a disease can be communicated from one animal to another there must be actual contact with some of the morbid products by direct or indirect means—by agencies which are now palpable and then obscure, but which are always in some form present—it would no longer be deemed presumptuous to affirm the possibility of arresting the progress of infectious diseases of animals, and at no distant period it might come to be admitted that the most virulent of contagious affections are more easily controlled than the ordinary diseases which arise from local causes; and if upon these concessions a consistent plan of action should be carried into effect, it might be demonstrated that the entire eradication of infectious diseases of animals is a thing of possible attainment, if not in actual course of fulfilment.

VIII.—*Aqueculture: its Importance—the Majority of our Streams suitable for Cultivation—the Re-discovery of an Artificial System gives new Life to Aqueculture—Nature* versus *Art—Fish Hatching—Gathering and Sowing the Seed—Good Advice—Watching the Eggs—How to Improve a River—Recapitulation—Ladders — Water-Police — Balance Sheet.*—By WILLIAM PEARD, M.D., L.L.D.

EACH year that passes leaves behind some lesson fraught with warning, encouragement, or instruction. The *moral* application of this truth has no place here. We are concerned less with the sad experiences of the human breast, than with the triumphs of art, or the secret workings of nature, and as regards the latter, in no case has our knowledge made more satisfactory progress than in aqueculture. Its necessity has been acknowledged, and its worth demonstrated; whilst experiments skilfully designed and laboriously carried out, have taught us the *modus operandi*; but before entering at length into the subject of practical water-culture, we will say a few words concerning its present importance.

None will deny the great commercial value of any discovery calculated to increase the supply of animal or vegetable food; for by it the wants of the poorer classes, and an opening for judicious investment, would alike be supplied, and obtained. The great improvements recently effected in all agricultural operations, leave us little ground to hope, that for some years at least, our soil can be substantially more productive than it is, whilst present prices prove incontestably how far such supply is below the national requirements. Moralists and statesmen, philosophers and medical men alike connect indigence with

crime, and acknowledge from different points of view, the political importance, and moral obligation of improving as far as possible the dietary of the poorer classes. It has long been admitted that the social elements by which we are surrounded exercise a large and almost unavoidable influence on our moral state. Want is a terrible tempter; men must eat; and with food at its present price, the small residue of their earnings must too often prove insufficient to obtain such lodging and raiment as modern civilisation demands. Scarcity therefore, itself a great evil, brings with it other evils still greater. Need we point to the mournful examples furnished by the unventilated alleys and pestilent courts so numerous in our larger cities. They are moral plague spots. We are acquainted with the existence of the disease, and know that if men are compelled to herd together like beasts of prey, because an undue proportion of their daily earnings is expended in the purchase of daily bread, physical degradation is too apt to induce moral decadence. Crime is an expensive evil, far more costly than a thousand experiments; can we, therefore, overestimate the importance of any discovery, that tending to introduce comparative plenty, may inaugurate a more healthful state of social and physical life amongst our poorer neighbours! Assuming then that we cannot expect such a blessing from the land, we are naturally led to inquire what the inland waters of the United Kingdom can effect towards an end so important. We trust to furnish a practical and satisfactory answer to this question.

As nearly any description of soil will yield remunerative crops under judicious management and moderate outlay, so nearly any river of average purity and clear outfall, with a free passage from its source to the sea, is capable of producing, under good direction, a remunerative harvest of salmon.

Having briefly shown in a former paper that *combination*, *management*, and *capital*, are necessary to place a water-farm in good working order, it is needless in this place to insist further on these elementary principles; we will proceed, therefore, to describe somewhat at length, the mode in which the art is now successfully carried on at home and abroad, and next discuss various matters necessary to render pisciculture a profitable investment.

The science of aqueculture is as old as the Cæsars, but like many other arts, seems to have been lost when barbarism triumphed over civilisation. An epoch, the most voluptuous the world ever saw, passed away with Imperial Rome; luxury for the time perished with her; more simple tastes prevailed, and men learned to be content with what nature gave. A few years since water-culture was revived with great spirit in France, by the discovery that the artificial and successful incubation of

fish eggs was not only a remote possibility, but a present certainty. Under the enlightened policy of the Emperor, the art has since been carried to a high degree of perfection at Arcachon and Huningue. A brief sketch of the latter, which in no essential degree differs from the former, may not be unacceptable to the reader, who must, however, remember both are national institutions, and far beyond the requirements of any private aqueculturist.

The series of buildings erected in this nursery are admirably suited to the purpose for which they were designed. The entire establishment, including ponds, canals, and hatching-houses, covers an area of nearly eighty acres. In what may be considered the front of the building, are two extensive galleries filled with tanks for the purpose of supplying water to the egg boxes, whilst at the back, lie the library, laboratory, and offices. The chief business carried on at Huningue consists in the collection and distribution of eggs taken from the best kinds of fish, such as the various species of trout, Danube and Rhine salmon, and the greyling; still these grounds contain a large number of ponds and canals where fish,—on which it is considered advisable to experiment,—are kept. It is time, however, to come nearer home.

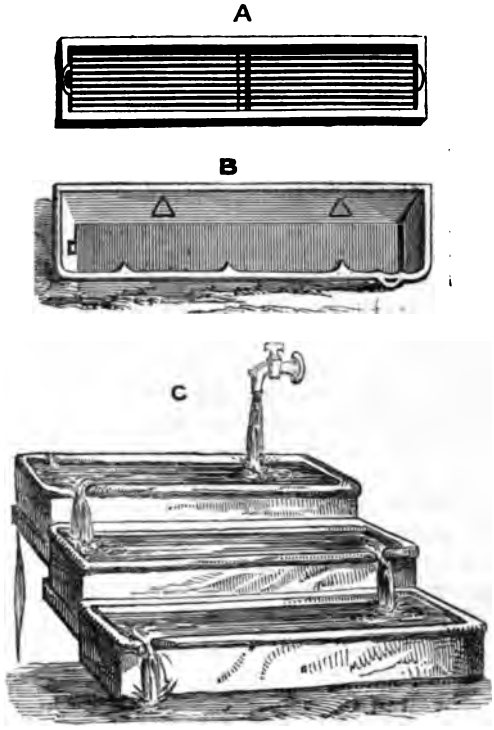
"In 1852," writes the earliest and perhaps the most successful of our aqueculturists, "we caught a trout on the spawning bed and squeezed 600 salmon ova out of its stomach." Again the same observer, whilst considering the destruction occasioned by aquatic insects, remarks, "as an instance of this I may state that we once deposited 70,000 salmon eggs in a clear and beautiful stream, admirably suited for hatching, but when the time arrived for vivifying, we found they had been eaten by the embryo of the dragon-fly, nor could we discover a single living fish out of 70,000 ova deposited."

Now from these and many other dangers it is quite possible to protect the seed and fry for a period of fifteen months, and to a moiety of the stock we are able to extend nearly perfect security for twelve months longer; to seek further evidence, therefore, in favour of the artificial system, would be a mere waste of time. Many of the water-farms now in course of cultivation are barren whilst the remainder possess stocks lamentably deficient.

Every fishery, whatever may be its productiveness, would course become still more productive with the assistance of the artificial system. No salmon river should be without its nursery: a terrestrial farm may as well be without manure. therefore, the rule applies to streams like the Earne, Tay, Moy, Blackwater, and others, it must be *imperative* on waters which are more or less exhausted. A nursery is the aqueculturist's road to wealth; with its aid he must succeed, since it increases

; revenues enormously, and requires an insignificant annual m for its efficient maintainance. As a matter of necessity, erefore, breeding-boxes must be erected, and fertilised ova ocured for the majority of our farms, in order to obtain, as on as possible, a breed in some measure adequate to the pacity of the property.

There are several kinds of vessels at present employed for the urpose of hatching fish, and these differ considerably in size, ape, and material. Those invented and now used by M. Coste Huningue and Arcachon, consist of a series of glass bars set ngthwise in a wooden frame called a "grille," which fits into glazed earthenware trough, and is supported on small projecons, in order to ensure a constant and sufficient supply of fresh ater passing not only over the upper, but also along the *lower* urfaces. These water baths—a sketch of which is given—are



A. The "Grille."
B The Trough in which it fits.
C A set of Boxes, showing the mode of supplying and distributing the water.

ne foot eight inches in length, five inches in width, and from hree to five in depth. Three, four, or five of these troughs are

arranged each above and beyond the one below, like so many steps, whilst an iron or earthenware pipe conveys filtered water, and opens into the upper box, maintaining a small but unfailing current, which runs to the opposite end, and insures that the stream shall not only flow along the whole length, but pass through each pan in succession. If this process is carried on under cover, as in France, and some parts of Scotland and England, a cheap frame made of deal is sufficient to support the troughs, and complete a most efficient apparatus. Each grille is capable of containing with ease 1000 salmon ova, which must be placed side by side on the glass bars, and then the water being turned on, the process of artificial hatching has commenced. In this country more simple machinery is employed, consisting of long boxes made of slate, and supplied by a similar arrangement of pipes, whilst the same stair-like form is followed. The size, however, is considerably greater not only as regards each box, but also as to the number of such boxes connected together. Those at present in use at the Horticultural Gardens, Kensington, are three feet two inches long, seven inches wide, and about seven inches in depth, the series consisting of six steps, whilst the cost of the entire apparatus does not exceed 5*l.* sterling.

Fish eggs, if only subject to suitable conditions, as surely yield living fish, as the eggs of fowls produce living birds, and the method above detailed will ensure successful results, provided no hostile agencies are present. It is in our power effectually to guard against these, and it is the possession of such power, that raises the artifical so immeasurably above the natural system. It is well known that 3000 eggs of the salmon, deposited by the parent fish under the most favourable circumstances, scarcely produce one grilse for the market, and it is equally certain, that nineteen-twentieths of the whole loss is experienced in the fresh water, and that more than a moiety of it occurs *prior* to hatching. The most formidable enemies to the increase of salmon are the larvæ of aquatic insects, and by filtering the water employed, *these* can be effectually excluded, and property of enormous value saved.

The slate-troughs in use at South Kensington are half-filled with gravel cleansed from the eggs of insects by heat—that which I saw had been boiled—and on such beds salmon eggs repose in perfect security.

Many pisciculturists employ modifications of the breeding boxes already described, but these, as they only differ slightly in form, size, or material, need no further notice. We will suppose then that the best apparatus has been selected and placed in the nursery; there is, however, more work to be done before the apartments are fit for the reception of our infant stock.

The breeding establishment at Stormontfield has now stood

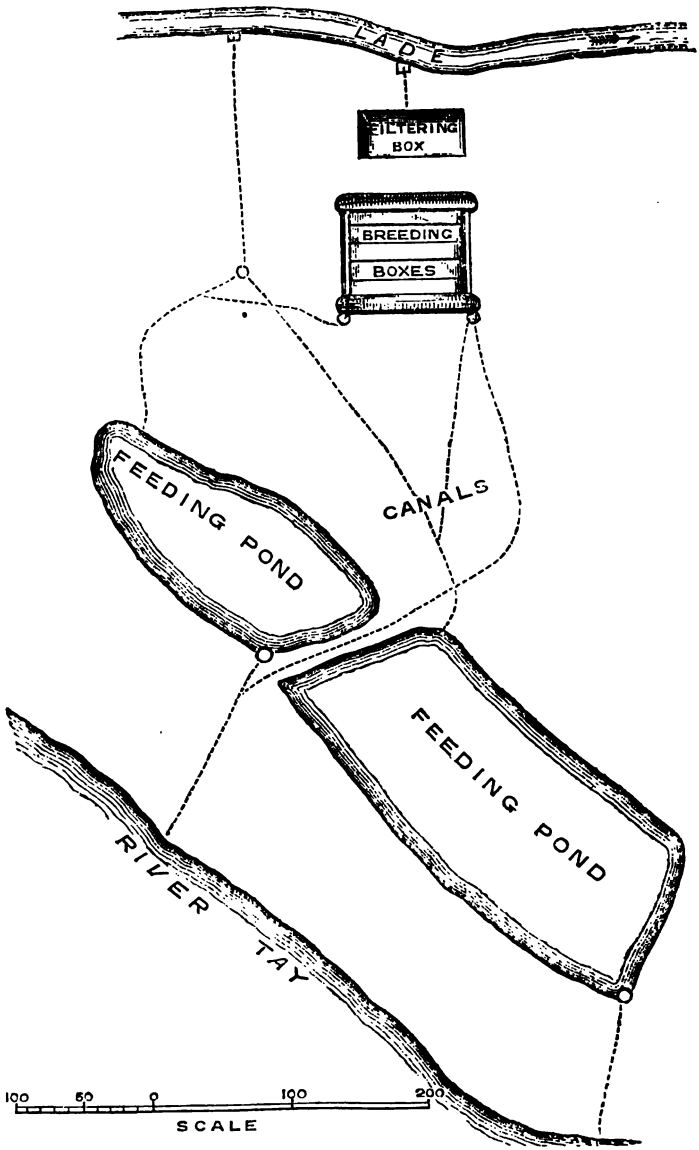
he test of thirteen years' experience, and may fairly be supposed o represent our most advanced opinions. Indeed it is difficult o imagine anything better calculated to promote the end designed. Instead, therefore, of a verbal description, we will give ı rough outline of the nursery over which Mr. Robert Buist has so long and ably presided. (See plan next page.)

Although a sketch may in many cases render verbal description unnecessary, in a treatise like the present we are compelled to enter as much into principles as practice. Ripe fish can always be secured during the month of November, but as the gathering of the seed, though a simple, is also a delicate operation, we must enter at some length into a few of the methods at present employed to obtain it. This necessary branch of industry commences, as we have said, early in November, and the first step is to run a net over the nearest spawning-bed. Should the future farm contain anything like a stock, eight or ten fish may be brought to land, but out of these not more than two or three in all probability will be found in a state fit for our purpose. We will suppose that a spawner and milter sufficiently matured have been taken, the evidence of such maturity being the entire absorption of the bands of tissue, which in the earlier periods of gestation bound the eggs into one firm and solid mass. The pisciculturist having ascertained that the peas are perfectly detached from each other, proceeds to operate.

In many places the female fish is carefully and gently held in a perpendicular position over a tub, bucket, or other convenient vessel, containing a little water, when the eggs being entirely separated from each other, flow naturally, though slowly, from the oviduct. The hand of the operator is, however, always used to accelerate the process, which, of course, from a due regard to the life of the fish, must be very brief. The eggs are now lying at various depths in the water, and a moiety of the work is accomplished. The milter is next taken in hand, and held in a similar way; a very small portion of the milky fluid, however, is sufficient to vitalize the entire mass. Both the parents are, of course, returned to the river, and the contents of the vessel gently stirred by the hand to insure that the milt and the water are so thoroughly mingled, that each egg shall receive its due proportion of life-giving matter. The success of the operation becomes immediately apparent, each egg assuming a pink hue.* The first sweep of the net has, probably, produced thirty or forty thousand ova, but as this number is far below our requirements, other draughts must be made on the nearest spawning-beds. Meanwhile each bucket being quietly and quickly conveyed to

* This passage, as well as one previously quoted, is extracted from a work published by the writer during the earlier part of the present year.

the nursery the spawn is so placed in boxes, previously prepared for its reception, that no egg shall touch the next; the tap



in connection with the filterer is then turned on, and artificial hatching begins.

But experience has taught us many lessons, not only regarding the number of eggs to be placed in any definite space, but also the best method of arranging them, the rule being that out of any given number, success is in the ratio of space, overcrowding having been invariably found to end in immediate loss and subsequent disappointment. During the earlier part of winter the pisciculturist must work with energy and perseverance on every available opportunity, for the weather is capricious in November, and floods materially interfere with his harvest operations. If through supineness or over-confidence in the future, a favourable opportunity is wasted, he sustains a loss which can never be repaired. Time and tide wait for no man, and when he would be up and doing the day of grace has passed, and ripe fish can no longer be obtained. Their seed has already been deposited, and for that season the artificial system, so far as he is concerned, is null and void. And here we cannot but admire the forethought with which Mr. Buist provides against a difficulty liable to happen at any moment, by his conversion of the mill-lade into what he calls "the lying-in hospital." The structure, though perfectly efficient, was not costly, requiring only a strong grating at either end of the mill-stream which supplied the nursery. Whenever the weather proved suitable for netting, gravid fish were collected and placed in the wards, from whence they could always be taken when ripe. This establishment is so worthy of imitation that no nursery should, on any pretext, henceforth be erected without its private hospital.

The eggs after deposition must be subject to constant and judicious inspection; dead ones should be removed; pipes carefully attended to, and the boxes narrowly watched, so that no marauding insect may injure the hopes, no stoppage of water mar the prospects of the proprietor. If these causes of failure be obviated, at the expiration of a period ranging from 115 to 130 days, he will reap the first reward of his labours. Day by day, during several weeks, two tiny black specks—the eyes of the future salmon—may have been seen to grow larger and more black, proving to the observer that his ova were doing well. Some morning, hundreds of heads emerge from the shells, and a few days later numbers of weak and helpless little creatures—nourished, but encumbered with the umbilical bag—may be noticed lying languidly on the gravel, and in this stage of existence are what the French call "alevins." All fish are predatory, and devour lesser denizens of the stream; it is not difficult, therefore, to imagine the countless thousands which must each day perish in every salmon river for want of that care the pisciculturist can alone bestow.

We have seen the eggs hatched successfully, and the alevins resting securely in the canals and ponds of the nursery: there we may leave them for a time, whilst we inspect the river and place it in order to receive them on their return from the sea. In doing so attention must be paid to all obstructions, whether natural or artificial. Blasting will probably remove the one, whilst "passes," properly constructed, will enable ascending fish to surmount the other. Pools and fords should be stoned or staked to guard against poaching; the drainage from towns, and refuse from manufactories carefully watched; mill-streams fenced with wire gratings, and spawning-beds improved and enlarged. The importance of this last-mentioned farm work can hardly be overrated, and to its accomplishment, the amiable owner of the important Galway fishery attributes much of his great and well-deserved success. As the value of a salmon farm depends on the extent of its breeding-ground, the protection extended to the parent fish, and the degree to which artificial hatching is carried, the importance of what has hitherto been advanced must be evident.

We will suppose fifteen months to have elapsed, and that a moiety of our par, having passed into the smolt stage, are ready for migration. Mr. Buist, once a sceptic in the faith to which he has long since become so sincere a convert, describes what he felt and observed when this time arrived, in the earlier days of his experiments. "I saw the seed of salmon deposited in our boxes, like peas sown in a garden; and I saw it come to life in like manner. With feelings of delight I traced the young fish from the egg to the smolt state; I saw them take their departure for the sea, and part of them return during the same season as grilse:" and such, too, will be the feelings of every aqueculturist whilst exultingly viewing his first triumph.

On the 7th of June in the present year a Salmon-fishery Congress was held in the Council-room of the Horticultural Gardens, South Kensington, and as much that there transpired, enforces what has already been advanced, we make no apology for referring to its proceedings. It was stated that "the object of the Congress was to *insure* a greater supply of food for the public by the protection of the salmon during the earlier stages of its existence, and that the means by which they hoped to accomplish this design were increased legislative powers, artificial hatching, cultivation of the beds of our rivers, insuring a passage for the fish from the sea to the source of the stream, by the removal or decomposition of pollutions, by guarding weirs and mill-streams, and lastly, by protecting the salmon during the breeding season from the assaults of poachers."

Such is the extensive and beneficial scheme proposed by the

oblemen and gentlemen who were leaders of the Congress—a cheme which brings prominently before the public several points n which considerable stress has been laid in the present paper. f the Salmonidæ cannot reach the head-waters of a river, they iust soon decrease, and will surely, but slowly, die out. To iaintain a free commuication, therefore, between the source nd the sea, should be a primary object with the pisciculturist. Vithout this right of way his hopes will prove illusive, and his ibours fruitless. To make difficult or insurmountable obstruc-ions passable, involves nothing less than the failure or success f a salmon farm. Before entering somewhat minutely, therefore, nto the question of "ladders," we may as well pause and medi-ate on the following instructive facts.

"Some centuries ago our rivers probably were as prolific in almon as those in the State of Maine, where Mr. Atkins (a gentleman employed by the State to investigate the subject) nforms me that the rivers Penobscot and Kennebec, of 500 miles n length, produced annually 180,000 salmon, before any weirs iad been erected upon them. In thirty years the number caught ias been reduced to 2100 annually, since the passage of fish ias been interrupted by the building of impassable dams for nanufacturing purposes. He states that three other rivers—Androscoggin, Saco, and St. Croix—of 220 miles, and most of he rivers in the State, are in the same condition as the Ken-iebec."

Thus writes Mr. Ashworth; and more conclusive evidence was never furnished as to the injury inflicted on rivers by the erection of barriers more or less insurmountable to the salmon in ts periodical migrations. In our streams, too many of these weirs unfortunately exist, and must continue, since even the large powers vested in the Commissioners cannot do away with pre-scription. Thousands of impediments have been removed, but oo many still remain and must be endured. "It is idle,"—in he words of Mr. F. Buckland—"to say that manufacturers should iot do this or that." They possess as good a right to the use of he water as any other part of the community, though they have *no* right to injure other interests whilst employing it for their own. Yet rivers might be made profitable not only to mill-owners but to the public; and this can be accomplished by the erection of passes, and the protection of our streams from refuse more or less poisonous, which manufacturers, under heavy penal-ties, should be compelled to decompose, utilise, or otherwise dis-pose of, without injury to their neighbours. Since, therefore, weirs and dams will continue, and since the Salmonidæ must pass beyond them if our rivers are to be cultivated, the question of fish-passes may well be deemed important. Unfortunately

many of these ingenious puzzles can only be regarded as injurious playthings, toy-problems, which no fish can be expected to solve. Admirable in intention, too many of our ladders are, it is to be feared, sadly faulty in construction. Probably the best "pass" in the world is to be seen on the Severn, near Holt, and since it may advantageously be adopted as a pattern, we cannot do better than describe it. At its south-eastern corner, the weir appears to be an inch or two lower than at other parts, and this insures a fine current. The space extending from the bed of the river below, to the water-level above the dam, might be represented by an acute triangle, the base of which would rest against its south-western face; and this is filled up with blocks of stone, over which runs so captivating a stream, that salmon—were they not sober-minded and strongly disposed to attend to the serious duties of life—might waste a good deal of valuable time in sailing up and down the run "for the mere pleasure of the thing." Such a pass offers at all times an easy means of *passing!* It is in effect a Queen's gap of the most perfect kind, and very unlike some of the cork-screw puzzles, into which it is a wonder if a fish finds his way, and a miracle, if he succeeds in getting through successfully.

It must not, however, be supposed that we underrate the original design; very far from it. Some assistance must be given to the salmon in his migrations, and some means found to aid him in climbing over barriers otherwise insurmountable; but the only question is how this can be best accomplished.

The great majority of "passes" I have seen run straight over the face of the weir, without any adequate provision being made for regulating the supply which ought to flow through them, and consequently in an average of years they are impassable during half the season, either from having too much or too little water. We know a salmon can struggle through extraordinary natural difficulties; that he will leave the sea and rush over fords so shallow, in order to enter his own river, that half his back is uncovered. I have seen the feat performed a thousand times, but this is a different affair from scaling a difficult artificial contrivance. All animals are habitually suspicious, and a salmon that would make desperate efforts to pass an obstruction of a kind to which he had been accustomed, whether that difficulty [illegible] from paucity [illegible] water, might well be expected to [illegible] between t[illegible] "too much or too little," when [illegible] throw[illegible] [illegible]rming a novelty as an ill-constructed pass[illegible] [illegible]queces[illegible] this natural hesitation are obvious; [illegible] [illegible]ally dangerous, and some day, "in a drought," [illegible] [illegible]ped under [illegible]e animal, whose too great caution has [illegible] [illegible]orth with goes to [illegible] instead of pro-

eeding to the spawning beds. The very word "pass" shows ssistance is intended. Why then should it not be made effective y rendering the passage as easy as possible. In the erection of ladder therefore the first points to be ensured are that it shall ise from the deepest part of the pool below; that it shall consist f a series of *falls;* that by longitudinal compartments it shall e sufficiently narrow to carry a good stream if the weather be ry, yet capable of discharging a far larger quantity of water in time of floods. Each of these objects can be obtained by fixing flush-boards at the upper extremity of the compartments before mentioned. A ladder therefore should be natural in construction, and as uniformly accessible as circumstances admit. If there is always sufficient water, occasional excess will not be injurious, because salmon do not run in the height of a fresh, but either when the flood begins to rise, or else when it is half run down.

The position of the ladder is a question of no little importance. It is the opinion of our greatest practical pisciculturists that the pass should be placed *not in the centre, but at the side.* The angle at which the ladder is set must depend on the average volume of water which may reasonably be expected to flow over it, the rule being to make the run of moderate depth; in fact nature should serve as a model. Let any one about to erect a pass walk to the nearest "salmon leap," and see how the great architect has placed a ledge here and a boulder there, as "buttress and coign of vantage," in short, as so many bars in the ladder, and then let him go and do likewise.

Before the return of our first brood from the sea we must organise our river-police and water-keepers. This force would be of course unnecessary during the first two years; after that time, however, it will be absolutely required. During the period referred to, the only persons necessary to be kept in permanent employment would be the man and boy in charge of the nursery; henceforth, however, our rural police will be servants, constables, militia, and regular troops, all in one. They will take, pack, and transport our fish to the nearest railway station. Will apprehend such vagrant boys as destroy the fry; will keep those given to poaching under "surveillance," and during the early winter, watch the roods night and day to guard the frontiers from marauders.

Now it must be obvious that a body of men required to discharge duties so varied and important should be carefully selected, well-taught, and adequately paid. Considering the subject of great importance to the well-being of any river in course of cultivation, we will say a few words on each of these heads. In the selection of every recruit character should be

made a *sine quâ non.* Often acting alone and under trying circumstances; contending with darkness, cold, wet, and hunger; with bribery and intimidation brought alternately to bear on his cupidity or fear, he must fall, unless supported by moral strength. Nor can he so fall without great injury to his employers. He should also be instructed in his duty,—taught what to do,—and what to leave undone,—when it is wise to act, and when it is more prudent to be passive. On the Severn, water-bailiffs are furnished with a brief and plain summary of the law they have to enforce, and are moreover taught to understand it. This plan is so excellent that it cannot be too highly recommended. No economy can be more ruinous to fishery proprietors than under paying their staff. The office is one of trust, vexation, and difficulty, and should by superior pay be made an object of desire. Few men struggling with want are proof against temptation, but principle becomes stronger and temptation weaker as men are removed from its lowering influence. I have seen a good deal of river-police, and know that the miserable pittance they receive—in Ireland at least—is a constant source of loss to their employers; they have no interest in the property; none in the maintenance of their position; their work is too often done negligently and inefficiently, and the money thus saved is indirectly the most costly item in the expenses of a salmon fishery. The evils created by this narrow and short-sighted policy would be at once avoided by a wise liberality. An advance of wages, regarded as a mere commercial speculation, must prove a first-class investment, and 16*s.* a week would, in the majority of cases, secure a diligent and honest executive. The number of men necessary to watch a river requires a little discussion. During the spring and summer, one man to every six miles of water will generally be found sufficient. As the season advances the force must be increased, and massed on or about the principal fords, at which time one keeper to every two or three miles will be needed to ensure efficient protection.

As we have improved and stocked the river, it is time to inquire what it might reasonably be expected to produce; in other words, what percentage it should pay on rent and expenses. As a large farm, cultivation being equal, will yield more than a small one, so a large river, under judicious management, will produce more than a smaller stream. We must, therefore, select one of definite extent before drawing up our balance-sheet. Let us assume, then, that the entire length of our water-farm is about 32 miles, and that it flows through many estates; this will give an extent of ripal rights equal to 64 miles, and if each mile represents one share, on which an annual call of 5*l.* can be made, there is a clear annual income of 320*l.* for expenses and the

quivalent of rent, which last is nearly nominal, as the stream is n the hands of the owners. This sum would be more than ufficient to meet all the earlier outlay for construction, wages, nd the like. In a former paper great stress was laid on the mportance of union amongst landlords; and here we once more ssert, without fear of contradiction, that on its existence depends he fate of the salmon-farms now rising in various parts of England. Our opinion is, that the formation of each river into omething resembling a joint-stock company would be the most eady means of obtaining this union. There is no inherent bjection to the plan, whilst there is every motive for adopting it; and whilst hearty co-operation must ensure success, selfish livisions will for the time, at least, destroy not only a certain ource of profitable investment, but a social blessing not easily verrated.

It has been shown in what manner an annual sum could be collected more than sufficient to meet all necessary expenses: we will now endeavour to show what returns may be expected, and must request the reader to suppose that four seasons have glided away since the farm was first taken in hand. That time has, however, worked wonders: the ova first deposited in our boxes have long since become par; these in due season changed into smolts, entered their parent river as grilse, gained the spawning-grounds, and were permitted to commence housekeeping in the old-fashioned way, with the exception of about a score, whose eggs were taken to fill the breeding troughs. The nursery, too, has done its work, turning out each spring some 80,000 smolts.

In the fifth summer the river would become productive, and, under average management, ought to produce 11 tons of salmon, which, at the present price, would represent something above 1100*l.* In the following season the yield, as a matter of course, would be greater; and should produce at a low calculation 1400*l.*, which, after deducting expenses, would allow a dividend of about 14*l.* per share. The value of such share, if we suppose five calls to have been made, will represent 25*l.*, bearing interest at a rate little short of 55*l.* per cent.

It must not, however, be supposed that our farm has reached its maximum of profit, or that it is by any means fully stocked. In fact, we are unable to say with any degree of accuracy to what extent a river may not be developed by the combined influence of art and nature. So far as our present experience goes, it is evident success has hitherto been in the ratio of artificial propagation, improvements, and the number of its breeding fish. Indeed, there seems no limit to production, since the more smolts we send to sea, the greater will be the produce of the following harvest. The land, in the pre-

sent state of agricultural knowledge, can only give a certain return; but our salmon-streams own no such restrictions, for the ocean feeds and grows the crop we reap. There is no fear of our water-farms being exhausted by their fertility, for the "king of fish" employs them not as pasture-grounds, but as a highway along which he passes to deposit the treasure destined to feed and enrich mankind.

The future of our salmon-farms will depend on the care, labour, and intelligence bestowed on them. Enough has been said to show that such property offers a first-rate commercial speculation; but, like any other concern, it may be ruined by carelessness or incompetence. We, however, have pointed out how a barren river can be improved; how spawning-grounds may be multiplied; how a nursery should be built and managed; have spoken of various details necessary to insure success; and have, in conclusion, presented our balance-sheet by way of illustration. Nor must our readers suppose the picture to be painted in too glowing colours, for a stream of which we are lessee, with a course not exceeding 23 miles, and on which artificial hatching is unknown, annually produces a rental larger than that assigned to our water-farm, whose extent is assumed to be nearly one-third greater.

We have thus endeavoured to point out how a river previously unproductive, might be converted into valuable property, and have given a few figures illustrative of the income derivable from it. Let imagination, however, picture all the streams in the United Kingdom in an equal state of cultivation,—What a prospect would they present to the capitalist, the legislator, and the philanthropist! Want of space forbids our entering into a nice calculation of the enormous mass of first-class nitrogenous food they would annually supply. Would it be too much to say, that this collective produce would equal the amount of animal food yielded by the entire pasturage of Great Britain? We believe not. If this be true, and there is little reason to doubt it, what visions of wealth to the speculator and hope to the poor are spread before us by the art of pisciculture. At present it is but the grain of mustard seed, the least among herbs; but it will become a great tree.

In this paper the salmon has alone been considered; but aqueculture has more extended views. Our water-farms can grow several crops at the same time, each with little injury to the other, and acclimatisation has already pointed out two or three kinds of fish well suited to our rivers and lakes. Amongst these the *Coregonus albus*, one of the salmon family, will probably, at a distant date, rank as high in England as it now does in America. Its naturalisation would indeed be a triumph, nor [illegible] interfere with the original inhabitants of

ritish waters. This new claimant for public favour is said to e a vegetarian, whilst nearly all our best domestic fish are canibals; every new comer, therefore, possessed of more simple istes, whilst capable of adding largely to the national stock of ood, would receive a hearty welcome from every water prorietor. The *coregonus* attains a considerable size, running from lbs. to 4 lbs., and is as delicate as a Dublin Bay haddock fresh rom the sea.

In many parts of England the waters at present are without ny recognised value; but, touched by the finger of art, they vould assume a new aspect and rise at once into pecuniary imortance. Much remains to be said; many points of importance iave been passed over for want of space, whilst others have been oo lightly handled; yet enough has been written to show what :ould with certainty be accomplished. We possess the knowedge; let not the will be wanting.

SALMON FISHERY ACT, 1865.*

District of the Rivers Avon, Brue, and Parrett.—It may be interesting to the public generally and to the gentlemen in particular who have been appointed Conservators for this district, to know what has taken place in reference to the formation thereof, and the placing it under the powers of the Salmon Fishery Acts. In the month of May, 1866, an Association was formed at Bradford-on-Avon, and a public meeting held on the 11th of that month for the purpose of taking into consideration the best method of preserving and increasing the supply of the better sort of fish in the River Avon. A committee was formed and the principal landowners on the Avon and its tributaries communicated with; it was however felt that it would be impossible to take any effective steps unless the district was put under the powers of the Salmon Acts. Acting upon this the committee sought the advice and assistance of Mr. Francis Francis, a gentleman well versed in the habits of the salmon, and who inspected the Avon, and from the encouraging nature of his report and upon Mr. Ffennell's recommendation, resolutions were come to in October 1866, and the requisite notices given at the Somerset (January) Quarter Sessions, and application was made to the Secretary of State in accordance with the terms of the Act to form a district, accordingly embracing the Avon and its tributaries, and its estuary in the counties of Somerset, Gloucester, and Wilts, and part of the city and county of Bristol,

* From the 'Bath Chronicle,' Nov. 14, 1867.

together with so much of the estuary of the Severn and the coast of Somerset, as lies between the Avon Battery upon the north, and Sand Point on the south, extending to mid-channel, and all rivers running into the sea between the points above mentioned. Upon the consideration of this application, the Home Secretary immediately gave a notice extending the district as far as the western boundary of the county of Somerset, abutting upon the Taw and Torridge fishery district, including therein all streams flowing into the sea and the coast lying between those points, and being within the several counties of Somerset, Gloucester, Wilts, Devon, Dorset, and the county of the city of Bristol, and certified by a notice in the papers, and dated the 27th March, 1867, that the fishery district above described was duly formed by him. The extension of the district, including as it does the whole of the rivers Avon, Yeo, Axe, Brue, Parrett, Tone, and their tributaries, and half of the Bristol Channel along the coast of Somerset, provides a large area, over which dues can be raised by the issuing of licenses, thus placing at the disposal of the Conservators an immediate income to be available for the removal of obstacles on the different rivers and streams, so as to give the fish free access to their spawning grounds. Due notice having been given, a "Joint Fishery Committee," consisting of three magistrates from each of the counties concerned, viz., Somerset, Wilts, Gloucestershire, Dorset, Devon, and Bristol, was appointed. Bath was fixed upon as the place of meeting for such committee. The duties of this "Joint Fishery Committee" consisted in settling a list of gentlemen as "Conservators." Several meetings were held, and great pains were bestowed upon the matter, so as to name gentlemen throughout the whole of the district who should represent the interest of every river and stream of importance, so that care might be taken of all waters likely to prove spawning grounds, and these Conservators may hereafter, if they please, form themselves into committees for the preservation of their own waters, accounting annually to the general body, who have power to apportion the income derived from licenses over the different rivers. Such list has been prepared, and the following are the numbers nominated for each county:—Somersetshire, 209; Wiltshire, 89; Gloucestershire, 15; Dorsetshire, 14; Devonshire, 4; county and city of Bristol, 4; total, 335. It may be as well to state a few of the leading provisions of the Salmon Fishery Acts, especially that of 1865, under which the "Conservators" are appointed. *The open seasons for fishing are as follows:*—For *Salmon*, with net or any other legal kind of instrument, except rod and line, from 2nd February to 31st August inclusive (except during the weekly close time, *i.e.*, from 12

o'clock on Saturday to 6 a.m. on Monday, throughout the season), and with rod and line, at any time from 2nd February to 31st October inclusive. For *Trout*, at any time from 2nd February to 31st October inclusive. All persons using nets and angling must have a license from the "Conservators," and that whether they fish in their own waters or not. The price of such licenses will be fixed by the Conservators. The Act gives full power to follow and seize illegal engines for catching fish, and for apprehending all persons having fish "foul" or out of season.

IX.—*On the Sources and Supply of Nitrogen to Crops.* By PROFESSOR S. W. JOHNSON, Yale College.*

IN giving an account of the recent investigations concerning the sources and supply of nitrogen to crops, it will be necessary to go back to first principles, in order to prepare ourselves for a complete understanding of the matter. Allow me, therefore, to make a brief review of the subject of nitrogen as related to agriculture.

In the first place let us inquire what part nitrogen performs in the sustenance of the animal, and how it thereby contributes to the comfort and support of mankind. Nitrogen is demonstrated to be indispensable to the very existence of man and every other animal. Those ingredients of the food which the animal converts into its working tissues contain invariably about 15 per cent. of nitrogen. This element exists to the same amount in muscles, in tendons, in the nerves, and other essential parts of the animal body that are of organic origin. More than this, the animal itself has no power to construct a solitary atom of the material out of which it makes its own muscles and tendons. It finds this material ready made in plants, which are primarily the food of all animals. It is the function of the plant to do this work for the animal.

In the animal we find *fibrin* solid in the muscles, and liquid in the blood, we find *albumin* in the blood, in the egg or embryo, and in all the liquids of the body that are not excretions, we find *casein* in milk, the perfect food of the young. In plants principles exist that are strikingly similar to those just enumerated; we have the *gluten* of wheat which is essentially a mixture of *vegetable fibrin* and *vegetable casein*, we find *vegetable albumin*

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* A Lecture delivered before the Connecticut State Board of Agriculture, at New Haven, January 8th, 1867.

in the juices of plants, and in the seeds of the oat, of maize, of the bean, pea, &c., vegetable casein is a large ingredient.

None of these *albuminoid* bodies, as they may be termed, exist in the soil or in the air. The plant organises from the substances which it feeds upon—substances that are derived from the earth and the atmosphere—vegetable fibrine, vegetable albumin, and vegetable casein. The animal feeds upon plants and moulds over these vegetable principles into the fibrine, albumin, and casein of its muscles and other tissues, of its blood, milk and other secretions.

These nitrogenous ingredients of our bodies are as essential to our life and power as the iron and brass of a steam-engine are necessary to its construction and working.

Unless we derived the material containing nitrogen from the plant, we should not be able to repair the constant waste of our bodies. The plant itself cannot exist unless supplied with the substances from which it can organise albumin, fibrine, and casein. If we should remove nitrogen from our soil and atmosphere we should do away with all organic life, for the germs of all living things are largely constructed from the nitrogenous matters we have mentioned, and without albuminoids there is no growth in plant or in animal.

Now the question arises, whence does the plant acquire this essential nitrogen?

In the atmosphere that surrounds us, nitrogen is the chief ingredient. It forms, in fact, four-fifths of the weight of the air, a quantity by no means trifling. It is estimated that the atmosphere contains no less than 4,389,000,000,000 tons of this substance.

We see thus that there is no deficiency of this element in the air. But this nitrogen has no direct or immediate effect upon animal life. It is of no active use in respiration. Every time we breathe, four-fifths of the air we inhale is this gas, which contributes in no way whatever to the vital processes or to the well-being of the animal. The nitrogen of the air is simply mixed there with other gases, but is not chemically united to anything. It is what we call *free nitrogen.*

Let us inquire what are its relations to the vegetable kingdom. The plant, as we well know, grows chiefly at the expense of the air. Of every load of hay we put into the barn, 80 *per cent.* is derived from the atmosphere, of every bushel of grain 84 *per cent.* is furnished by the air alone. In hay there is 8 *per cent.* of albuminoids or flesh-forming materials, in grain there is 9-13 *per cent.* of these substances. But although the air is an immense and unfailing reservoir of nitrogen, the latter is, for the most part, of no more direct use to plants than it is to animals.

The chief solid ingredient of plants is carbon. It is this hich remains in a comparatively pure state when plants are eated out of contact of air, as in the making of charcoal. 'arbon, which forms nearly half the weight of all dry vegetable iatter, is, or may be, derived by the plant exclusively from the ir. Common air contains $\frac{1}{2500}$ of its bulk of carbonic acid gas, compound of carbon. This is sucked in by the leaves of egetation, and its quantity, though relatively small, has been roved to be amply sufficient for the demands of the most igorous growth.

The question naturally arises, can a plant take up nitrogen rom the immense volume of this gas floating about it in the tmosphere? This question has been investigated by a number f intelligent experimenters, who have come to the conclusion, rom several long series of trials, that the free nitrogen of the air ias no effect upon the plant. There is, in fact, no absorption, io fixation of nitrogen when in the free state.

It is to a distinguished farmer and philosopher, to the Frenchnan Boussingault, whose name is destined to be for ever illusrious for his devotion of a long life and ample fortune to the tudy of agricultural science and the advancement of agricultural ractise that we are mainly indebted for the solution of this roblem.

Boussingault settled the question of the assimilation of free iitrogen in the following manner. The plant is developed from seed, and if the seed be planted where the future plant shall eceive no supply of nitrogen except from the surrounding air, ind if we know the amount of nitrogen in the seed with which ve commenced the experiment, and find that there is no further ncrease of it in the plant, obviously there is no absorption or ssimilation of this element.

But if we find that the crop contains more nitrogen than the eed, then the reverse of this proposition must be true, assimilaion of the nitrogen of the air must occur.

Boussingault took some pumice-stone and by treatment with ire and acids freed it from nitrogen. In order to supply everyhing else which the plant needed, he mixed this with some shes, which furnished the necessary mineral matter. He sowed n this prepared soil, which was placed at the bottom of a arge glass globe of 20 gallons capacity, a number of seeds, he weight of which was known. He moistened this with absoutely pure water, so that nowhere in the apparatus was there iny nitrogen, save the free nitrogen of the air and the nitrogen f the seeds. He furnished carbon by attaching a second iarrow-necked globe to the first, which was filled with carbonic icid gas. By cementing the two globes together, all communi-

cation with the external air was then cut off, and the apparatus was placed in a garden with full exposure to sunshine, where it remained for several months during spring and summer. The seeds sprouted and the plants grew to a considerable height. When they had obtained their fullest development, *i. e.* when they obviously grew only at their own expense—the lower leaves withering away by the absorption of their juices for the nourishment of new foliage above—the experiment was terminated by disjoining the globes, removing the plants and soil, and ascertaining by chemical analysis how much nitrogen the crop contained. Previous analyses of seeds similar to those planted showed what quantity of nitrogen was in them. It was found in a large number of distinct trials that *the nitrogen of the crop was equal to that of the seed, and it was accordingly demonstrated that the free nitrogen of the air is not available as such to agricultural plants.*

Let us now look further into the sources which may supply nitrogen to the plant, and see what other materials are at its disposal.

In the air we find small quantities of *ammonia* and of *nitric acid.* Ammonia is a compound of nitrogen and hydrogen. Nitric acid is composed of nitrogen and oxygen. These exist in the air in relatively very minute quantities. There is but one part of ammonia in fifty million parts of air, while nitric acid is commonly present in even less proportion. These quantities are so minute as to produce scarcely an appreciable effect upon a plant which is small enough to be weighed with accuracy. In fact, a plant weighing but a few ounces grows as well and acquires as much nitrogen when confined in a few gallons of air as when stationed in the free atmosphere, provided it be sheltered from rain and dew. It certainly gathers some ammonia and nitric acid from the air, but the quantity is too small to be estimated. When water is precipitated from the atmosphere in the forms of rain, dew, or fog, the ammonia and nitric acid of a large volume of air are gathered into a small bulk of the liquid, and therefore the atmospheric waters contain a notably larger proportion of these substances than the air itself.

Ammonia amounts to about 15 parts in ten millions of country rain. In city rains there may be ten times this quantity. Of nitric acid there are three parts in ten millions of rain, snow, and dew. Sometimes the proportion is larger, sometimes smaller.

The figures in the subjoined table give an idea of the amounts of these substances which come down annually upon a given surface.

In the years 1855-56, Mr. Lawes, a distinguished English experimenter, collected upon a rain-guage having an area of $\frac{1}{1000}$ of an acre, all the rains, dews, and snows that could be

gathered at his residence, Rothamsted, about 20 miles north of London. The waters for each month were separately analysed by Professor Way, Chemist to the Royal Agricultural Society of England, and the total quantities of ammonia and nitric acid found are given below, calculated for an acre of surface. Last year, 1866, Dr. Bretschneider published the results of a similar investigation made in Silesia, which are also stated below. The table gives likewise the quantities of nitrogen contained in both the ammonia and nitric acid.

Amounts of Nitric Acid, Ammonia, and Nitrogen, brought down upon an Acre by Rain, &c., at

	Rothamsted.		Ida-Marienhuette.
	1855.	1856.	1866.
	lbs.	lbs.	lbs.
Nitric acid	3	2·8	3·7
Ammonia	7·1	9·5	11
Nitrogen of the above	6·5	8·3	11

Now let us inquire what is the effect of these substances upon vegetable life. We all talk about ammonia as a fertiliser, and the fact that it is so has been abundantly confirmed by direct experiment. If you take pure ammonia, dilute it largely, and water plants with the solution (taking care to make it *very* dilute), good results will be invariably manifested. If you take the carbonate of ammonia—the salt of hartshorn of the smelling bottle—and put a piece as large as a chestnut upon the hot air pipes of a greenhouse, you will see that the salt disappears, and as it passes off into the air of the greenhouse it is absorbed by the plants, and influences their growth in a marked manner.

Two compounds of ammonia that are produced on a large scale by manufacture are considerably employed in Europe and to some extent in this country as fertilisers. These are the sulphate and muriate of ammonia.

In this country we are not much acquainted with the value of nitric acid or nitrates as fertilisers. In England saltpetre or nitrate of potash has been extensively employed as a manure, and now the cheaper nitrate of soda is consumed there in immense quantities for this purpose.

In the following table are given the proportions *per cent.* of nitrogen in ammonia and nitric acid and in their compounds which are employed in agriculture:—

	Per Cent. of Nitrogen.
Ammonia, dry	82·4
Nitric acid	25·9
Sulphate of ammonia	21·2
Muriate of ammonia (sal ammoniac)	26·1
Nitrate of potash (saltpetre)	13·8
Nitrate of soda (soda saltpetre or Chili saltpetre)	16·4

That these compounds of nitrogen produce excellent upon crops is shown in a multitude of cases by the recc British agriculture. In one trial Mr. Pusey, President Royal Agricultural Society of England, obtained an incr 7 bushels of barley per acre by an application of 42 lbs. of of soda: 112 lbs. of nitrate of soda per acre is an ordinary dr in Great Britain. This quantity gave Mr. Bishop, of M Castle, 2 tons 3 cwt. of hay per acre, against 1 ton 1½ cwt. undressed land. Mr. Newman, of Surrey, obtained wit same amount 60 bushels of oats on a field, the undressed p of which yielded but 40 bushels.

Boussingault has described a long series of experiments, exhibit the effect of nitric acid upon vegetation in a most st and instructive manner.

Among others he made the following:—Two seeds of a sunflower, the *Helianthus argophyllus*, were planted in e three pots, the soil of which, consisting of a mixture of dust and sand, as well as the pots themselves, had been thor freed from all nitrogenous compounds by ignition and w with distilled water. To the soil of the pot A nothin added save the two seeds and distilled water, with whi the plants were watered from time to time. With the pot C were incorporated small quantities of phosphate o of ashes of clover and bicarbonate of potash, in ord the plants growing in it might have an abundant supply the mineral matters they needed. Finally, the soil of received the same mineral matters as pot C, and, in addi small quantity of nitric acid as nitrate of potash. The see sown on the 5th of July, and on the 30th of Septemb results were certainly remarkable: in the second pot produced, by the aid of 20 grains of nitrate of potash, weighing 198 times as much as the seed from which i The plants were quite equal to those grown in the rich s garden. In the first pot, A, the plants weighed but $3\frac{7}{10}$ and in the third, C, $4\frac{6}{10}$ times as much as the seed. It is that the soil of pot D contained every element requisite support of a vigorous vegetation. The contrast of results strates further that nitric acid is a good and of itself a su source of nitrogen.

The largest quantity of nitrogen brought down from mosphere annually, in the forms of ammonia and nitric a the experiments of Lawes, Way, and Bretschneider, just was 11 lbs. This corresponds to 85 lbs. of nitrate of potash, of itself is an important manuring. It is not enough, ho for ordinary crops, as is shown by the great effects of applications. We must, therefore, look lastly to the soil

ı not only receives nearly uniform supplies of assimilable ɣen from the atmosphere, but has its own peculiar stores rogen, which, though never entirely wanting, vary in quantity ɣreat degree.

ıt a dozen years ago it was generally believed that the am- a of the soil is the natural and proper food of plants as ·ds a supply of nitrogen. It had indeed long been known nitrates aid the growth of plants, but Liebig taught that it probable that nitrates are converted into ammonia in the and, in any case, the main source of nitrogen for vegetation ımmonia. Late investigations demonstrate that, in general, oil contains a proportion of ammonia no larger than exists e atmosphere itself, and indicate with much certainty that tes are the chief dependence of the plant for nitrogenous

itrates of lime, potash, soda, &c., are *formed in the soil* dantly under certain conditions. They are freely soluble in r, and hence are washed out of the soil by rain, and passing drains, springs, and rivers, are carried off into the ocean in ense quantities. Thus, according to Boussingault's calcula-, based on his analyses, the Rhine daily removes from the drained by its tributaries a quantity of nitric acid equivalent 0 tons of saltpetre. The Seine daily pours nitrates corre- ling to 270 tons of saltpetre into the Atlantic, and the Nile ss than 1100 tons into the Mediterranean.

has long been known that *nitrification, i. e.* the formation of tes, is a process that rapidly proceeds under some circum- es in the soil; indeed the nitre of commerce is entirely ·ed from accumulations that take place in the earth's surface inless regions, or during dry weather; or lastly, in sheltered tions.

ıussingault first made an accurate study of the extent and lity of this process. In the year 1857 he experimented on a men of garden soil, which was kept fallow in a heap under ɜr, with frequent slight waterings, so that neither gain nor ıf nitrogen compounds could occur, except through chemical ɣe. Analyses made at various intervals gave its contents of : acid, which, calculated in lbs. avoirdupois, for the area of ıcre to the depth of 12 inches, were as follows:—

	Lbs. of Nitric Acid per Acre, to Depth of 1 foot.
5th August	54
17th August	120
2nd September	340
17th September	408
2nd October	395

In this case nitrification proceeded very rapidly in the hot August weather, and was not checked until the middle of September, and then probably on account of the cold.

We have positive data to the effect that the nitrogen of the soil, like that of the atmosphere, is for the most part unavailable, directly, to vegetation.

Boussingault, in experiments upon his garden soil, already mentioned, found that when it was employed in small quantity, a pint or so, it was scarcely more capable of supporting vegetation than the most barren sand entirely destitute of nitrogen. A number of his trials were made with pots holding 2000 grains of garden soil, which *contained six grains of nitrogen.* In this quantity of soil the crops, in eight experiments with lupins, beans, maize, and hemp, amounted when dried to but three to five times (in one case eight times, and on the average four times) the weight of the seed. In thirty-eight similar experiments with sand destitute of nitrogen, a crop was obtained, weighing on the average three times (in one case six times) as much as the seed.

In the three experiments already described (p. 108), the addition to a totally barren soil of 3 grains of nitrogen (20 grains of nitrate of potash), made a crop weighing 198 times as much as the seed. It is plain, then, that the garden soil, in the quantity of 2000 grains, failed to produce a good yield, because it could not furnish enough nitrogen to the plants. But, as we said, it contained no less than *six grains of nitrogen*, or twice as much as was employed in producing the large sunflower of pot D (p. 108). Our only explanation of these remarkable facts is to be found in the conclusion that, of the abundant nitrogen of the garden soil, but very little existed in a condition available to plants. It must have been for the most part unassimilable and inert, as is the free nitrogen of the atmosphere. The analysis of the soil, as made at the beginning of the experiments, shows, in fact, that but a trifling proportion of nitrogen was present as ammonia and nitric acid. The soil contained in 100 parts:—

[illegible]tal nitrogen	0·26100
[illegible]mmonia	0·00220
Nitric acid	0·00034

[illegible] of 14 inches, we have,

[illegible]	
[illegible]mmonia	
Nitric [illegible]	[illegible] of potash.

[illegible] occurred in the forms of [illegible] a [illegible] acid. This proportion is abundant for field [illegible] potash [illegible] as a manuring,

would satisfy the largest demands of agricultural practice. The soil, which was fertile in the garden, was barren in pots, because the quantity of it at the disposal of a single plant was far too small to supply it with nitrogen. Boussingault found by actual measurement that, according to the rules of garden culture practised in his neighbourhood, a dwarf bean had at its disposition 35 lbs. of soil, a potato-plant 198 lbs., a tobacco-plant 480 lbs., and a hop-plant 3000 lbs. It could not be expected, then, that 4 oz. of soil would have much effect on a plant in furnishing it with nitrogen, when but 1-130th of its nitrogen was available.

Boussingault deems it highly probable that in this garden-soil, and in soils generally which have not been recently manured, ammonia and nitric acid are the exclusive feeders of vegetation with nitrogen. Such a view is not indeed absolutely demonstrated, but the experiments alluded to render it in the highest degree probable.

The large share of the nitrogen in the soil is certainly proved to be inert. It exists there in a condition similar to that in which it occurs in peat and in bituminous coal. Peat often contains 2 or even 3 per cent. of nitrogen; but this has, in general, very little effect on vegetation, unless the peat has been acted upon by some vigorous chemical agent, so that its nitrogen is made to assume a new form. In leather shavings we have an example of a fertiliser exceedingly rich in nitrogen, but acting very slowly as compared with nitrate of soda. When stable-manure ferments, or alters by keeping, its nitrogen passes to a great extent into this inert condition, and in fields heavily manured year after year with animal manures, like the garden soil Boussingault operated on, nitrogen accumulates in a form that is of no use directly to plants.

This inert nitrogen may, however, be modified by chemical action and made capable of feeding vegetation. There is going on perpetually in nature a succession of changes whereby the free gaseous nitrogen of the atmosphere and the inert nitrogen of the soil are passing into the compounds ammonia and nitric acid, while on the other hand ammonia and nitric acid suffer decomposition or alteration, and gaseous nitrogen or inert compounds of this element are formed from them. These opposite processes counterbalance each other on the whole, and preserve equilibrium between the air and the soil. But they do not proceed uniformly on all parts of the earth's surface, nor even on fields that lie contiguous to each other. It may happen that in one soil nitrogen is withdrawn from circulation and rendered for the time useless, and in another it is restored to its function of supporting vegetation. Circumstances only determine what occurs in any given

case. These circumstances it is important to understand, for the ability to control them in many cases may prove of great pecuniary advantage to the farmer.

The late researches of Bretschneider in Silesia are adapted to instruct us upon some of these points. Bretschneider's experiments were made for the purpose of estimating how much ammonia, nitric acid, and nitrogen exist or are formed in the soil either fallow or occupied with various crops during the period of growth. For this purpose he measured off in the field four plots of ground, each one square rod * in area, and separated from the others by paths a yard wide. The soil of one plot was dug out to the depth of 12 inches, sifted, and after a board frame 12 inches deep had been fitted to the sides of the excavation, the sifted earth was filled in again. This plot and another—not sifted—were planted with sugar beets, another was sown with vetches, and the fourth with oats.

At the end of April, six accurate and concordant analyses were made of the soil. Afterwards, at five different periods, a cubic foot of soil was taken from each plot, and from the spaces between that bore no vegetation, for determining the amounts of nitric acid, ammonia, and total nitrogen. The results of this analytical work are given in the following tables, being calculated in pounds for the area of an acre, and to the depth of 12 inches (English measure):—

TABLE I.—AMOUNT OF AMMONIA.

	Beet Plot, Sifted Soil.	Beet Plot.	Vetch Plot.	Oat Plot.	Vacant Plot.
End of April	59	59	59	59	59
12th June	15	48	41	32	28
30th June	12	41	24	40	32
22nd July	9	29	39	22	29
13th August	8	15	16	11	43
[illegible]th September ..	..	16	16	7	23

[illegible] AMOUNT OF NITRIC ACID.

[illegible] April	56	56	56	56	56
12th June	281	270	102	28	106
30th [illegible]	328	442	15	93	318
22nd July	116	89	58	..	43
[illegible] August	53	6	71	14	81
[illegible] September	..	..	12	..	..

[illegible] Dressing

TABLE III.—TOTAL NITROGEN OF AMMONIA AND NITRIC ACID.

of April	63	63	63	63	63
June	84	109	60	33	50
June	95	148	23	57	108
l July	37	47	31	18	35
August	21	14	31	13	56
September ..	..	13	16	6	19

TABLE IV.—TOTAL NITROGEN OF THE SOIL.

l of April	4652	4652	4652	4652	4652
l June	4861	5209	5606	6140	4720
l June	4667	5744	5688	5514	4482
d July	5398	5485	..	4724	4924
h August	5467	6316	6316	6266	4412
September ..	5164	4656	6522	5004	4294

From the first Table we gather that the quantity of *ammonia* ich was considerable in the spring, diminished, especially in orous (sifted) soil until September. In the compact earth or uncultivated path, its diminution was less rapid and less nplete. The amount of nitric acid (nitrates) on the other d increased, though not alike in any two cases. It attained maximum in the hot weather of June, and thence fell off, til, at the close of the experiments, it was completely wanting e in a single instance.

The figures in the second Table do not represent the absolute antities of nitric acid that existed in the soil throughout the iod of experiment, but only those amounts that *remained* the time of taking the samples. What the vegetation took from the planted plots, what was washed out of the surface l by rains,* or otherwise removed by chemical change, does come into the reckoning.

Those plots, the surface soil of which was most occupied by ive roots, would naturally lose the most nitrates by the agency vegetation; hence, not unlikely, the vetch and oat plots conned so little in June. The results upon the beet and vacant und plots demonstrate that in that month a rapid *formation nitrates* took place. It is not, perhaps, impossible that nitriation also proceeded vigorously in the loose soils in July l August, but was not revealed by the analysis, either because vegetation took it up, or heavy rains washed it out from the face soil. In the brief account of these experiments at

* Nitrates may be easily and completely removed from the soil by water, ereas ammonia is chemically retained by good soils.

hand, no information is furnished on these points. Knop has shown that *moisture* is essential to nitrification, so that it is possible a period of dry weather coming on shortly before the soil was analysed in July, August, and September, had an influence on the results.

We observe further that the nature of the crops influenced the accumulation of nitrates, whether simply because of the different amount of absorbent rootlets produced by them and unequally developed at the given period, as is most probable, or for other reasons, we cannot decide.

From the third Table may be gathered some idea of the total quantity of nitrogen that was present in the soil in a form available to crops. Assuming that ammonia and nitric acid chiefly, if not exclusively, supply vegetation with nitrogen, it is seen that the greatest quantity of available nitrogen ascertained to be present at any time in the soil, was 148 lbs. per acre, taken to the depth of one foot. This, as regards nitrogen corresponds to the following dressing:—

	Lbs. per Acre.
Saltpetre (nitrate of potash)	1068
Chili saltpetre (nitrate of soda)	898
Sulphate of ammonia	909
Peruvian guano (14 per cent. of nitrogen) ..	1057

The experience of British farmers, among whom all the substances above mentioned have been employed, being that 2 to 3 cwt. of any one of them make a large, and 5 cwt. a very large application per acre; it is plain that in the surface soil of Bretschneider's trials *there was formed during the growing season a large manuring of nitrates in addition to what was actually consumed by the crops.*

Table IV. confirms what Boussingault has taught as to the vast stores of nitrogen which may exist in the soil. The amount here is more than *two tons* per acre. We observe further that in none of the *cultivated plots* did this amount at any time fall below this figure; on the other hand, in most cases it was considerably increased during the period of experiment. In the uncultivated plot, however, the total nitrogen fell off somewhat. This difference may have been due to the root fibrils that, in spite of the utmost care, unavoidably remain in a soil from which growing vegetation is removed.

The regular and great increase of total nitrogen in the vetch plot was certainly due in part to the abundance of leaves that fell from the plants and covered the surface of the soil. But this nitrogen, as well as that of the standing crops, must have come from the atmosphere, since the soil exhibited no diminution in its contents of this element.

We must conclude from the facts before us that ammonia as *aturally supplied*, is of very trifling importance to vegetation, nd that, consequently, nitrates are the chief natural means of roviding nitrogen for crops.

It is of the first importance then, to know the conditions f their formation. These we will briefly recount so far as nown :—

1. There must be a *source of nitrogen*. This may be either mmonia, the free nitrogen of the air, or lastly the inert nitrogen f organic matters and of the soil.

2. As nitric acid is a compound of nitrogen with oxygen, he nitrogen must be in circumstances that admit of *its combination with oxygen*. Above all, the presence of the *free oxygen* of he air is indispensable, and the soil must be *porous* so as to dmit of aëration.

3. W. Knop has demonstrated that the soil must be *moist*. n a soil that is *dry*, as well as in one *saturated with water*, nitrification cannot go on.

4. *A certain temperature* is requisite, the limits of which are ot indeed ascertained, but it is well known that nitrates are ormed most rapidly and abundantly in tropical climates, and in ot weather.

5. Nitrification does not proceed in the soil except in presence f decaying (oxidising) *organic matter*. In nearly 40 experiments y Boussingault, on the growth of plants *in soils destitute of rganic matter*, there was no appreciable gain of nitrogen, while n his trials with *garden soil*, as well as in Bretschneider's nvestigations in the field, nitrogen accumulated either in the oil, or in both soil and crop.

So far as we can frame a theory of nitrification, it is as ollows :—

In many processes of oxidation by free oxygen gas, as it ccurs in the atmosphere, a portion of the oxygen is converted nto a modified form, having extraordinary chemical activity. f, for example, phosphorous, which is employed in making friction matches, be exposed to moist air in a warm room, it unites apidly with oxygen, while, in a short time, a gaseous body is roduced which has a peculiar unpleasant odour, and which is apable of oxidising free nitrogen to nitric acid. This substance is called ozone, and Schoenbein, its discoverer, prepared considerable quantity of nitrate of potash by simply causing noist, warm air to stream over phosphorus, and then through otash-lye for a time. The same conversion of oxygen into ozone s accomplished by electrical discharges, and the formation of itric acid in the air is undoubtedly due in part to the electrical zonisation of oxygen and its subsequent action on nitrogen. It

has been supposed that other oxidations are attended with development of ozone, and it is highly probable that when organic (vegetable or animal) matters decay or oxidise in the soil, ozone is generated which is not recognisable to the chemist, because it expends itself in the conversion of nitrogen into nitric acid. This is the only supposition which serves to explain the necessity that organic matters be present in the soil for the production of nitrates. If this hypothesis be correct, as is extremely probable, nitrification is a process which accompanies oxidation, and its intensity is heightened by moisture, by presence of organic matters, and by elevated temperatures, because these conditions are essential to rapid oxidation.

It is in this way that the *free nitrogen of the air* becomes at once part of a compound adapted to nourish plants, and an ingredient of the soil.

With the oxidation of the organic matters of the soil, a part of their nitrogen is converted into nitric acid, when the oxygen is present in sufficient abundance. But to bring the great stores of inert nitrogen that exist in most cultivated soils into immediate use, requires the intervention of another chemical agent.

Lime, it has been asserted, has served to reclaim more land than all other applications together. Its action is complex, but one of its most general effects is doubtless to bring inert nitrogen into an active condition. Any alkali or substance exerting the action of an alkali operates in the same manner. The vigour of the action depends upon the solubility and amount of the material employed. As before remarked, Peat (swamp-muck) contains oftentimes a considerable proportion of nitrogen which in general is quite inert unless subjected to the influence of certain chemical agents. In the summer of 1862, the author carried out a series of experiments for the purpose of learning how to make this nitrogen available to vegetation. These experiments were first published in a treatise on 'Peat, and its Uses as Fertiliser and Fuel,' in 1866. They are reproduced here as illustrating in a practical way the action of alkalies on inert nitrogen.

A quantity of peat that had been weathering for some time on the "Beaver Meadow," near New Haven, was allowed to become perfectly air-dry, and was then brought to a fine uniform powder by rubbing through a sieve. The peat thus prepared contained 13·5 per cent. of moisture and 3·4 per cent. of nitrogen.

Twelve quart flower-pots, new from the warehouse, were filled as described below; the trials being made in duplicate:—

Pots 1 and 2 contained each 270 grams * of peat.

* 1 gram = 14·5 grains.

Pots 3 and 4 contained each 270 grams of peat, mixed with 10 grams of ashes of young grass.

Pots 5 and 6 contained each 270 grams of peat, 10 grams of ashes, and 10 grams of carbonate of lime.

Pots 7 and 8 contained each 270 grams of peat, 10 grams of ashes, and 10 grams of slaked (hydrate of) lime.

Pots 9 and 10 contained each 270 grams of peat, 10 grams of ashes, and 5 grams of lime slaked with strong brine of common salt.

Pots 11 and 12 contained each 270 grams of peat, 10 grams of ashes, and 3 grams of the best Peruvian guano.

In each instance the materials were thoroughly mixed together, and so much water was added as served to wet them thoroughly. Five kernels of dwarf maize (pop corn) were planted in each pot, the weight of each planting being carefully ascertained.

The pots were disposed in a glazed case within a cold grapery, by the kindness of Joseph E. Sheffield, Esq., and were watered when needful with pure water. The seeds sprouted duly and developed for the most part into healthy plants.

The plants differed remarkably in the vigor and extent of their growth, and thus served as tests of the feeding power of the soils or media in which they were situated. The guanoed pots enabled a comparison to be made with a well-known fertiliser.

The plants were all allowed to grow for several months, and until those best developed had apparently exhausted the food at their disposal and vegetated, not at the expense of the soil or mixture in which their roots were stationed, but at the cost of their own lower leaves, as was indicated by the withering away of the latter. The plants were then cut at the surface of the soil, and the crops, after drying in the air, were weighed with the subjoined results:—

VEGETATION EXPERIMENTS IN PEAT COMPOSTS.

Nos.	Medium of Growth.	Weight of Crops in Grams.	Comparative Weight of Crops, the sum of 1 and 2 taken as unity.	Ratio of Weight of Crops to Weight of Seeds, the latter assumed as unity.
1, 2	Peat alone	1·61, 2·59 } 4·20	1	2½
3, 4	Peat and ashes of grass ..	14·19, 18·25 } 32·44	8	20½
5, 6	Peat, ashes and carbonate of lime	18·19, 20·25 } 38·44	9	25½
7, 8	Peat, ashes and slacked lime	21·49, 20·73 } 42·22	10	28½
9, 10	Peat, ashes, slacked lime and salt	23·08, 23·34 } 46·42	11	30½
11, 12	Peat, ashes, and Peruvian guano	26·79, 26·99 } 53·78	13	35½

The above results are very instructive. Experiments 1 and 2 demonstrate that peat alone is deficient in plant food. In both pots but 4·2 grams of crop were produced, a quantity only two and a half times greater than that of the seeds, which weighed 1·59 grams. The plants were pale in colour, slender, and attained a height of but about 6 inches.

Experiments 3 and 4 make evident what are some of the deficiencies of the peat. A supply of mineral matters, such as are contained in all plants, being made by the addition of *ashes*, consisting chiefly of phosphates, carbonates and sulphates of lime, magnesia, and potash, a crop is realised nearly eight times greater than in the previous cases; the yield being 32·44 grams, or 20½ times the weight of the seed. The quantity of ashes added, viz. 10 grams, was capable of supplying every mineral element greatly in excess of the wants of any plant that could be produced in a quart of soil.

The plants in pots 3 and 4 were much stouter than those in 1 and 2, and had a healthy colour.

In the experiments 5 to 10, inclusive, is shown the influence of alkaline matters in solving and making available to the plant the inert nitrogen of the soil. Experiments 5 and 6 make evident that carbonate of lime, though feebly alkaline and slightly soluble, exerts a marked influence in this respect. The ashes employed contained more lime than could be appropriated by the plants, and the effect of the carbonate of lime in these trials cannot be explained save by its action on the nitrogen of the peat, which the former experiments indicate to be in an inert state. Under the influence of the carbonate of lime, the crop is raised from 32·44 to 38·44 grams, or from 20½ to 25½ times the weight of the seed.

In experiments 7 and 8, a more soluble and active agent was employed. The *caustic* (*slacked*) *lime* increased the crop from 38·44 to 42·22 grams, or from 25½ to 28½ times the weight of the seed. That its effect was not greater is due to the fact that the slacked lime could only act as such for a short time, for it rapidly absorbs carbonic acid from the air and is thereby converted into carbonate.

In experiments 9 and 10, a mixture of lime and salt was employed. This mixture is equivalent to an application of carbonate of soda, which is more soluble and therefore more active than the lime. It brings up the yield to 46·42 grams, or to 30½ times the weight of the seed.

The efficacy of these applications is only to be properly appreciated by comparing them with some well-known fertiliser. In experiments 11 and 12 this comparison is furnished. Peruvian guano, applied in a large dose, gave a crop but 35½ times the weight of the seed, although it must have left an excess of nearly every element of plant food in the soil.

: last experiments also conclusively demonstrate that in us trials it was a limited supply of *nitrogen* which limited ›ps, because active nitrogen is the only ingredient furnished guano which was not present in ample quantity, in all but st two experiments.

: mode in which lime or alkalies act upon the inert nitrogen t or of the soil is to some extent understood. When peat, il, and inert nitrogenous matters that may be employed as sers, as hair, wool, horn, leather-scraps, are heated with ›r other alkali, *ammonia* is copiously developed. The same ›rmation occurs slowly at ordinary summer temperatures. ingault gives the results of some experiments on this point, etails of which we need not repeat, but which demon- that ammonia is thus formed in soils containing organic rs.

: action of lime, carbonate of lime, or other alkaline ferti- is, accordingly, to convert inert nitrogen into ammonia. ammonia is either directly absorbed by vegetation, or ed into nitrates, and appropriated by plants in that form.

as long been known that certain crops are especially aided ir growth by nitrogenous fertilisers, while others are com- vely indifferent to them. Thus the cereal grains and s are most frequently benefited by applications of Peru- guano, dung of animals, fish, flesh, and blood manures, ıer matters rich in nitrogen. On the other hand, clover ırnips flourish best, as a rule, when treated with phosphates lkaline substances, and are not manured with animal ferti- so economically as the cereals. It has, in fact, become a f practice in some of the best farming districts of England, systematic rotation of crops is followed, to apply nitro- s manures to the cereals and phosphates to turnips. Again, fact that whereas nitrogenous manures are often necessary duce a good wheat-crop, in which, at 30 bushels of grain 600 lbs. of straw, there is contained 45 lbs. of nitrogen, a ›f clover may be produced without nitrogenous manure, in would be taken from the field twice or thrice the above ıt of nitrogen, although the period of growth of the two is about the same. These facts admit of another expression, over, though containing two or three times more nitrogen equiring correspondingly larger supplies of nitrates and nia than wheat, *is able to supply itself* much more easily he latter crop. In parts of the Gennesee wheat-region, it custom to alternate clover with wheat, because the decay clover stubble and roots admirably prepares the ground last-named crop. The same preparation might be had by ›re expensive process of dressing with a highly nitrogenous

manure, and it is scarcely to be doubted that it is the *nitrogen* gathered by the clover which insures the wheat-crop that follows. It thus appears that the plant itself causes the formation in its neighbourhood of assimilable compounds of nitrogen, and that some plants excel others in their power of accomplishing this important result.

Late investigations suggest the means of accounting for these facts. It has long been known that in a number of instances in which oxygen is liberated from its combinations at ordinary temperatures, a portion of it appears in the active form of ozone. When water is resolved into its constituent gases oxygen and hydrogen, by galvanism, the oxygen is mixed with ozone. The same is true in the galvanic decomposition of carbonic acid. So also when permanganate of potash (employed for cholera disinfection) or binoxide of barium yield up oxygen in the free state, by acting upon them with sulphuric acid, ozone is simultaneously developed. The leaves of plants are throwing off into the atmosphere, during all the time they are exposed to sunlight, free oxygen gas. All the oxygen which is removed from the air by the breathing of animals, by the burning of fuel, by the rusting of metals, and by the decay (slow combustion) of dead organic matter is replaced by the foliage of living vegetation. The formation of free oxygen is thus a process which takes place on an immense scale, and one which ceases in the northern hemisphere on the approach of our winter, only to begin in the southern zones, where at that time the summer opens. Its cessation in our longitude, when the sun goes down, is simultaneous with its awakening on the opposite side of the globe, where at that time the sun rises.

For a number of years it has been regarded as probable that ozone is generated in the act of decomposition, which takes place in green foliage under the solar influence; and that the oxygen restored to the air by the decomposition of carbonic acid in the plant, contains an admixture of ozone. During the last year, extended series of observations by Daubeny and Kosmann appear to demonstrate that such is the fact. It is plain that those crops which produce the largest mass of foliage develop the most ozone during their growth. By the action of this ozone the nitrogen that bathes the leaves is converted into nitric acid, which, in its turn, is absorbed by the plant. The foliage of clover cut green, and of root-crops, maintains its activity until the time the crop is gathered; the supply of nitrates thus keeps pace with the wants of the plant. In case of grain-crops, the functions of the foliage decline as the seed begins to develop and the plant's means of providing itself with assimilable nitrogen fail, although the need for it still exists. Furthermore, the

lover cut for hay leaves behind much more roots and stubble per acre than grain-crops, and the clover stubble is twice as rich in nitrogen as the stubble of ripened grain. This is the result of the fact that the clover is cut when in active growth; while the grain is harvested after the roots, stems and leaves have been exhausted of their own juices to meet the demands of the seed.

Whatever may be the value of our explanations, the fact is not to be denied that the soil is enriched in nitrogen by the culture of large-leaved plants which are harvested while in active growth, and leave a considerable proportion of roots, leaves, or stubble on the field. On the other hand, the field is impoverished in nitrogen when grain-crops are raised upon it.

A few words will suffice for the application of the facts and principles that have been set forth. The considerations that have been presented to notice argue strongly for the view that the aëration of the soil by drainage and tillage, the judicious succession of crops, and the properly combined or alternated employment of organic fertilisers, like peat or swamp-muck, straw, &c., and of alkaline applications as lime and shell marl, may suffice to supply the soil with abundance of available nitrogen without the necessity of having recourse to imported fertilisers. In fact, experience has a thousand times demonstrated the correctness of this view. The scientific studies which we have detailed are not needful to establish its truth, but first lead us to comprehend its truth and give us the immense advantage always to be derived from great principles of which we have a clear conception, and in which we are able to put implicit faith.

X.—*On Steam-Cultivation: the Advantages to be derived from it: its present Position and future Development.* By DAVID GREIG, of Leeds.*

IT is not my intention in this paper to treat of the mechanical part of the above subject. For, although the greatly varying nature of the soils and circumstances to be dealt with over the country renders it necessary to have many different adaptations of the apparatus employed, still, the machinery has now been so nearly brought to perfection that the farmer has no longer any difficulty in obtaining apparatus suited to his own particular requirements. The means employed to bring about such results as those to which I shall advert can scarcely be considered of that importance which the subject assumed during the earlier

* [Read before the British Association at Dundee, September 5, 1867.]

stages of steam-cultivation. The points I propose to deal with are:—The advantages to be derived by the farmer from the use of steam in the shape of better crops; tillage operations more economically effected; the lessening of the number of operations required; and, most important of all, work done at precisely the right time, and when it can be done to the greatest advantage.

I shall also advert to the present state of steam-cultivation, and its prospects for the future.

It is asserted by all who have tried spade husbandry that the crops obtained under that system are much better than those which can be got from horse-cultivated land. Indeed, this is so far the case that, although it cost from four to five times as much as horse-labour, its adoption has been found no disadvantage, where an abundance of labour, at a moderate cost, could be obtained to do the work at the proper time. This is now rendered impracticable by the present state of the labour-market in England. However, the fact of its superiority remains, nevertheless, indisputable. The chief feature of advantage in spade-husbandry is the thorough loosening and mixing of the soil, and as this is much better accomplished by steam, it logically follows that crops upon steam-tilled land will be far superior to those grown under horse-culture. And this is borne out by actual experience, the exchange of horse for steam-power being generally followed by a marked improvement in the crops, and much greater yield per acre, varying of course with the nature of the soil, but amounting in some cases to two quarters more corn per acre. Ample proof of the accuracy of this statement may be found in the recently published 'Reports of the Royal Agricultural Society's Commission on Steam-Cultivation,' a work with which, I presume, most agriculturists are well acquainted. The reason for this increased productiveness can be easily understood. A team of four horses ploughing a 12-inch furrow will leave more than 300,000 footprints per acre; and, as these nearly cover the ground, the effect, as every farmer well knows, is to leave a hard subsoil or "pan" beneath the cultivated ground, which becomes worse with every successive ploughing at the same depth. The tractive power that horses are able to exercise upon a plough or other implement is very limited, and is further decreased in consequence of having to convey their own weight over the broken and uneven soil, and also partly to undo the compression caused by the treading of their feet.

If a horse be taken when the land is in rather a plastic state, and walked across the track of the steam-plough, and made to travel to and fro transversely, on every ten inches width, until a breadth of six yards is trodden over, it is then found that, if the steam-cultivator has just sufficient steam to perform its work

roperly, before it arrives at the ground so trodden down, it will e completely stopped before it gets through the six yards; and onsidering the momentum of the fly-wheel, this experiment hows plainly that the power required is something very material, nd experience shows one-third additional draught to be required n land that has been trodden down to the same extent as in ultivation by horse-power. With steam the case is very different. The engine stands on the headland, and hauls the implement to and fro by means of a wire rope. All treading, and compressing of the soil and subsoil, is thereby entirely avoided, and the implement is driven at a much more rapid pace, throwing up the soil to a greater depth, and in a loose state, enabling it to derive full benefit from the influences of the atmosphere. It is found in practice that the rapid motion of the steam-driven implement tends to loosen and aërate the soil, much below the actual depth at which the tine or share is running. In horse or ox-ploughing, the case is just the reverse, as the sole of the plough and the treading of the animals so consolidate the bottom, that the necessary chemical action between soil and subsoil is prevented, and consequently all escape of gas and water. The result of the deep tearing-up and loosening of the soil at the proper time by steam is that its temperature is raised, and a much greater quantity of ground is penetrated by air. The air is replaced in the same proportion by water, when rain comes, and this moisture is retained in the cultivated ground as though in a sponge, any superfluous quantity sinking away to the drain beneath, instead of the whole lying for some time on a hard trampled subsoil, as though held in a dish, making the land cold and ungenial.

I am now more particularly referring to heavy land; but a similar result is observable in the case of light land. Light lands are never much damaged by wet; the principal danger is from "burning" in dry weather, but the deep cultivation and loosening of the soil, instead of having it lying on what might be termed a board, causes even light land to retain its moisture in a dry season for a considerable time. The mere question of aërating the soil deserves much more attention than is generally given to it. Mr. Bailey Denton has forcibly illustrated the importance of this question. He says, "Within a few miles of the metropolis, on Northpark Farm, Blackheath, Mr. Shepherd has raised a breadth of wheat, which any earnest agriculturist will be pleased to see. It is growing on land not naturally fertile, which Mr. Shepherd underdrained at his own cost, and has since cultivated with a steam-plough. The yield has been estimated by good judges as an average of 45 bushels per acre. At 8*s.* per bushel, this will bring 18*l.* per acre irrespective of the straw, which may be considered as equivalent to the harvest

expenses. Adjoining Northpark Farm is some very good wheat growing on similar land, equally well drained and treated, except in the one particular of steam-cultivation. It has been horse-ploughed. This yield may be fairly put at 30 bushels, which at the same price per bushel will bring 12*l.* per acre. Within sight of these two instances may be seen some wheat, also growing on land similar in character to Mr. Shepherd's, which has neither been drained nor steam-cultivated, the yield of which cannot be estimated at more than 20 bushels to the acre. The return in money at the same price per bushel will be at 8*l.* per acre. Hence we have within a short drive of London three cases of comparison, which cannot fail to show that by the adoption of deep steam-cultivation on deep-drainage, the produce from stiff soils may be doubled."

Steam-cultivation improves the crops in another way. If the soil has been thoroughly and deeply loosened, at the right period, and has not been consolidated, except by its own weight, the roots of the plants have ample liberty to penetrate until they are stopped by natural causes. In dry seasons the roots are thus enabled to follow the moisture in the ground very much further than would otherwise be possible; and, as no burning can take place until the deepest root has entirely exhausted the moisture around it, the crop is made capable of resisting the effects of drought for a very long time. I believe that the success or otherwise of a crop depends upon the number of cubic feet of soil that the roots are able to penetrate; and I have found that a grain-crop will stand up much better, and is not so easily laid, on a deeply-cultivated soil as on one that is shallow. From what has been said on this part of the subject, it will readily be conceded that a great improvement in the crops is one of the results that must inevitably follow the use of steam on the land.

At the present time, the cost of performing tillage operations by them is very far from being so low as it should be, or what it eventually will be. In many cases, and especially with machinery working for hire, the very heaviest portion of the work is given to steam, and generally that which cannot well be done by horses. Now, before we can obtain the maximum of cheapness, we must cause steam-power to perform all the operations connected with the tillage of the ground; for if, after steam-ploughing a field, horses are taken upon it, perhaps two or three times, for the purpose of harrowing or doing other similar work, the ground is of course trodden down and consolidated again The consequence is, that the next year it requires much more power to break it up than would otherwise be the case; and not only does it require this extra force, but clod-crushers and other implements have to be applied to it, which would not be required if the treading were avoided. The generality of land, if put under

steam-cultivation, and kept entirely free from the trampling of animals, would only require one very deep cultivating operation every fourth or fifth year, and would be kept in such a state as to allow air and moisture and the roots of the crop to penetrate freely, so that the cultivation of the cereal crops in the rotation would only require to be light or surface operations, sufficient to receive and cover the seed.

The cost of steam-cultivation has hitherto been greatly increased by the excessive breakages that have occurred to the machinery. These have arisen from two causes—namely, the want of men properly educated to the work, and the deficient construction of the machinery at first employed. The varying circumstances under which the apparatus had to work involved much more experimenting, to bring it to perfection, than would have been the case with any fixed machinery. These difficulties are now, however, altogether overcome; and, with ordinary good management, any mishaps of the kind named may be wholly avoided. With regard to the cost of steam, as compared with horses, I find, from careful observation, that, including interest on money, depreciation, and repairs, the average yearly cost of maintaining a set of steam-cultivating machinery, doing 2000 acres per year (say 10 or 12 inches deep), is under 300*l.*, or 3*s.* per acre. This allows money enough for its replacement in ten years. A good machine of this kind should displace over 30 horses, and, of course, many horse-implements. Now the wear-and-tear of the harness, implements, and the amount of farriers' and other bills, in connexion with these 30 horses, with interest and depreciation, will be at least twice as great as the corresponding items chargeable upon the steam-tackle. The average price of coals per horse-power per day—that is, the cost of the quantity of coals we should have to burn in an engine, to get out of it work equal to what one horse could do in a day—is 7*d.* It is quite evident that the daily keep of a horse must cost much more than this. Less than half the number of men, also, are required to do the same acreage of work, although their wages have to be somewhat higher than those of the ordinary farm-labourer.

Or to put the case more concisely: a pair of horses in an ordinary plough cannot pull with a force of more than 3 or 4 cwts. at the most, and a day of this work cannot cost less than 10*s.* On the other hand, a steam-ploughing engine will give off, during the whole day, eight or nine times that draught at a cost of certainly not more than 3*l.* These calculations are per day only; but as the horses have to be kept and fed when they are idle, as well as when they are working—which is not the case with the steam-engine—the comparison is manifestly unfair to the latter. The whole of the comparisons should be based on a yearly average; but it is rather difficult to come to a conclusion

how many acres a pair of horses can cultivate in a year, even supposing them to be exclusively occupied in such work.

But money is saved in another way. After a thorough deep ploughing or cultivating by means of steam, it is evident that only half the number of after-operations will be required to bring the ground to a sufficient tilth. In heavy land, twitch will be found to disappear altogether, as there will be no treading and planting of it by the horses' feet, which has so much effect in undoing the very operation while being performed, and consequently necessitating many successive operations in thoroughly cleansing the land. A steam-driven implement always tends to bring the weeds and rubbish to the top; never buries them. Heavy land is not naturally inclined to grow twitch; and if so much treading and trampling could be avoided, it is the writer's firm opinion that no such thing would grow on it, except through gross mismanagement or very light crops. The want of suitable implements has been a drawback to the cheap use of steam in tillage, as farmers have not been able to effect more than a portion of their work by its means.

Although it is no doubt an advantage to be able to do the farm-operations more cheaply than by horse-power, the writer looks upon this as of minor importance compared with the results referred to in the first part of this paper, and with the increased certainty that will attend the carrying out of the farming business, about which I shall say more presently. The cultivation of soil is a business that requires a great amount of care and attention. A very false idea of a farmer's business is conveyed, when it is said that any one is fit for farming; on the contrary, I do not know of any business which requires such minute attention and such keen observation; and this arises mainly from the extraordinary variations in the climate, weather, and soil, and the great effect these variations have upon the crops. Those persons who most carefully observe the state of their land, and never work it except at proper times, will derive the greatest advantage from it. On a farm under horse-cultivation, however, this is a very difficult task, as the small amount of profit yielded by farming will not allow the number of horses, &c., to be kept that would be necessary to deal with all the land at the right period and in the most economical manner. This inability to perform the work when the land is in its best condition involves its deterioration, until it can scarcely be considered to be in a growing condition, and not unfrequently involves the total or partial loss of a crop. When we reflect that there are only two or three months in the year during which tillage-work can be profitably performed, the fact that the horses are sometimes kept going continually, in order not to fall behindhand with the work, shows that the soil must often be operated upon when it is in a very

improper condition. But the person who farms by steam has a powerful and ample force at his disposal, so that he can afford to wait until his land is in a fit state for working; and this force is an untiring one, which he can work night and day, with relays of men, if necessary. You may often hear farmers complain that they have got behindhand with their work; and they will point out to you a field, or perhaps two fields, in which the crop has been nearly lost, simply because it was put in two or three days later than the remainder, or when the land was in a state unfit for its reception.

This occurs because the farmer is usually obliged to keep his working force of horses down to the narrowest possible limit, and the consequence is, that in some unfavourable seasons he requires twice the power at his disposal to do his work in time. But, as the writer has shown, these irritating and expensive difficulties are almost unknown to the man who farms by steam. Hitherto farming has very rarely been highly successful as a commercial undertaking, and when taken up by commercial men it does not often pay. The reason is that to effect the different operations required in the best possible way entails an expenditure all the year round which cannot be borne by the profits of farming. As the use of steam develops itself, however, farming will become a business in which a man may see his way with some degree of confidence, and be able to calculate beforehand the cost of each operation, and whether he will gain or lose by it. The season and the weather will have only half the control over the crops and tillage operations that they have at present. But before these results can be effected, it is necessary that the very cheapest system of cultivation—cheapest, I mean, as regards the cost per acre—should be adopted, that the tillage should be done at a given time, and at a cost not greater than that of the actual day's work. For instance, if, under the present system, a farmer were to take each field consecutively, and just calculate beforehand the cost of the different operations required for cultivating it under ordinary circumstances, he would probably find that such an estimate would have to be doubled before it could cover his actual expenditure; and this in consequence of wet days and other contingencies compelling him to keep his teams and men standing idle. Such a state of things in an ordinary mercantile business would be ruinous; and this is the great drawback in all calculations connected with farming—wet days have to be paid for exactly the same as dry ones, and often expenses are running on when real harm is being done to the land. Before, also, we can attain the cheapest system of cultivation, we must have the farm re-modelled in order to admit of engines and machinery being worked in the most profitable way, and, as the writer has before pointed out, we must have steam-implements that will

perform every operation required, so as to keep horses off the land altogether, and thus lessen the power required to till the ground. The land must be brought into a uniform state, and be consolidated only by its own weight. When these principles are thoroughly carried out, the cost of cultivation will be only one-half of what it is at present, even where steam is partially employed. It is important that the fields should be made of a size to suit exactly the routine of work that the farmer wishes to carry out, and arranged so that all the crops of one kind are together; thus avoiding unnecessary delays and removals. The removal of a number of implements from one field to another entails a loss of time which should be reduced to a minimum by making the fields as large as possible, consistent with the rotation of crops the farmer intends to follow. Some may argue that, as their farms consist of different kinds of land, they require a particular crop upon each kind; but the writer believes that when steam is used, the advantage of having the whole of a crop in one place more than counterbalances any drawbacks of this nature, except of course in very exceptional cases; and, besides, the fact that steam can work on one kind of land just as easily as another will often remove these objections altogether.

As an example of the advantages of enlarging fields and pulling down old fences, the writer would refer to the case of a gentleman in Essex—Mr. Prout, of Sawbridgeworth—who, on a holding of 450 acres, by pulling down fences and dividing his farm into seven or eight large fields, has gained no less than 16 acres of arable land—land which was formerly occupied by old straggling fences, trees, and water-courses; and this has been done at a cost which is trifling in comparison with the benefits obtained from the improvements.

The question of roads on a farm has an important bearing on the subject. There is an objection generally made that they take up too much ground, but this is altogether unfounded. The headlands, which are generally trodden down and compressed by horses and carts, require at least twice the cultivation of the other parts of the field, and yield worse crops; there can be consequently no profit in their tillage, and the width of a road dividing two fields is of course much less than that of two headlands and the hedge. But, however that may be, by having properly constructed roads on a farm the cost of taking off the produce is very considerably lessened—say by ½*d.* per ton on the whole. This would much more than cover the rent of the ground occupied, and prevents any treading on land to be cultivated.

When these and such kindred improvements are carried out, farming will become a business which any thoughtful and intelligent man may manage with profit, and will be free from most of the vicissitudes which now cause the investment of capital in

farming to be looked upon as of so precarious a character. Besides the advantages to the agriculturist, the nation at large will derive great benefit from the increased yield of crops, and also from the fact that the materials to feed the power used in tillage will be drawn from the coal-mine or the forest, instead of being taken from the produce of the fields. We shall not be obliged to import so much corn as hitherto, and a larger percentage of the crops will be converted into food for human beings, instead of food for horses.

In these days of dear labour, a very important point is the reduction in the amount of manual labour required to till the soil, together with the enlightenment of the agricultural labourer, tending to make him use his mind as well as his body. So far as this country is concerned, the state of the labour market is becoming a question which every farmer will have to study; for while the labourer is justly participating in the progress of the condition of people in this country, the rise in labour must materially lessen the former profits, except by employing such machinery as shall considerably diminish the number of men required.

XI.—*Steam Cultivation.* By J. H. COTTERELL, Bath.

IN 1866 the Royal Agricultural Society appointed three "Inspection Committees" with instructions to visit farms on which steam-cultivation has been adopted. The Secretaries of these Committees were respectively Mr. Howard Reed, Mr. J. A. Clarke, and Mr. John Coleman.

The Reports of these Gentlemen occupy 330 pages of the Royal Agricultural Society's Journal (Vol. III., Part i., 1867).*

The following pages profess merely to be a *Tabulated Index* to the valuable matter contained in these Reports, to which the reader must be referred for a mass of interesting detail.

This arrangement has the advantage of presenting at a glance the districts in which steam-cultivation has been adopted, together with some idea of its results.

Mr. J. A. Clarke remarks that the area visited by the Committees embraces 66,000 acres, "probably not one-third of the whole steam-tilled area in the kingdom."

At the conclusion of the Table will be found some remarks by Mr. Thompson, the President of the Society, which deserve attentive perusal.

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* This Report has since been published in a separate form.

TABULATED STATEMENT as to STEAM PLOUGHING, from the JOURNA

Page in R.A.S.E. Journal.	By which Committee Visited.	Name of Farm.	Tenant.	Situation.	Size of Farm.
					Acres.
100	Mr. Reed's ..	Little Stanbridge Hall.	Mr. W. T. Allen	Rochford, Essex	3000
103	Mr. Reed's ..	Foulness Island	Mr. C. C. Harvey	South Essex ..	300
105	Mr. Reed's ..	.. ..	The Earl of Leicester.	Holkham, Norfolk	500
107	Mr. Reed's ..	.. ..	Mr. S. Linton ..	Long Stanton, Cambridgeshire	500
109	Mr. Reed's ..	Woodhurst ..	Mr. Barton ..	St. Ives, Hunts	700
111	Mr. Reed's ..	.. ..	Duke of Manchester	Kimbolton, Hunts	700
114	Mr. Reed's ..	.. ..	Mr. G. Armstrong	Graffham, St. Neots.	750
116	Mr. Reed's ..	.. ..	Mr. Cranfield ..	Buckden, Hunts	1000
118	Mr. Reed's ..	Berden Hall ..	Mr. E. Roberts	Bishops Stortford, Essex	750

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Plough d used.	Cost of Plough, Tackle, and Engine.	Approximate Cost per Acre.	Cost per Day, including Coal.	Acres per Day Ploughed or Cultivated.	REMARKS.
	£. s. d.	s. d.	£. s. d.		
er's	1000 0 0	Cost.. .. 6 6 Wear, tear, and renewal .. 6 3 12 9	1 12 1	8 acres	"Horses are not reduced, but more work done, and more crops taken,"—p. 103.
er's	900 0 0	s. d. 12 0	..	8 or 9 acres	"In 1866 steamed 151 acres in 36 days, or 4½ acres per day; cost of manual labour, 26*l.* 14*s.* 5*d.*"—p. 105.
er's	885 0 0	.. ..	1 4 6	Subsoiled 2½ acres, ploughed 5 acres, cultivated 10 acres	"Steam has been used to great advantage."—p. 106.
ler's	875 0 0	.. ..	1 6 9	8 to 9	"Could say but little about increased crops."—p. 108.
ards'	500 0 0	.. ..	1 5 4	10 acres	"Embraced steam because he saw in it the means of working a heavy land farm to advantage."—p. 109. "Mr. Barton thinks that the possession of 300 acres of land as his farms would justify a man in attempting the use of steam."—p. 111.
th's	500 0 0	.. ..	2*l.* 10*s.* 0*d.*	6 acres	"Mr. Wallis considers that a farm of 400 acres would pay for steam tackle, &c. His experience at Kimbolton shows that not only is the yield of corn increased 4 bushels per acre, but that its market value is increased 2*s.* per quarter The root crops are also better . . . It was once difficult to say when 4 teams would finish a 20-acre field, but with steam the time can be stated within an hour"—p. 13. "The cost of 2*l.* 10*s.* per acre includes 1*l.* for wear and tear and interest, which Mr. Wallis considers excessive."
th's	470 0 0	9*s.* 9¾*d.*	1*l.* 7*s.* 3*d.*	First time, about 6 acres; second time, about 8 acres	"Feels assured he could not have stood his ground on this farm without steam, it being enough to ruin any man who did not employ steam."—p. 114.
th's	..	.. ..	1 3 2	6 acres	"Although he sees no benefit from steam cultivation to drainage, confesses that he grows roots on land that never produced them formerly, and feeds them off too."—p. 116.
er's	780 0 0	.. ..	1*l.* 6*s.* 8*d.*	Ploughed 5 to 6 acres, cultivated 8 to 12 acres	"The work is better done, and the soil lies drier during the winter, and is surer of producing root-crops."—p. 118. "Mr. Roberts considers that the results of steam are very perceptible in improved drainage."—p. 118.

TABULATED STATEMENT as to STEAM PLOUGHING, from the JOUR

Page in R.A.S.E. Journal.	By which Committee Visited.	Name of Farm.	Tenant.	Situation.	Size of Farm.
					Acres.
121	Mr. Reed's ..	Blount's Farm	Mr. T. Prout ..	Sawbridgeworth, Herts	450
127	Mr. Reed's ..	Baynard's Park	Mr. Thurlow ..	Horsham, Sussex	1400
129	Mr. Reed's ..	.. ..	Messrs. Impey and Bott	Broomfield, Chelmsford	500
131	Mr. Reed's ..	Desning Hall ..	Mr. A. C. King	Higham, Suffolk	840
134	Mr. Reed's ..	Colkirk	Mr. Chambers	Fakenham, Norfolk.	707
135	Mr. Reed's ..	.. ..	Mr. Alfred Ruston	Chatteris, Cambridgeshire.	940
137	Mr. Reed's ..	.. ..	Mr. F. Battcock	Hemingford, St. Ives, Hunts	970
[illegible]	[illegible]		Mr. T. Hammond	Penshurst, Tunbridge, Kent	540
[illegible]	[illegible]		[illegible]	Ninfield, Hastings, Sussex	260
[illegible]	[illegible]		[illegible]	Rengeo, Ware, Hertford	1000

RICULTURAL SOCIETY, VOL. III., SECOND SERIES, 1867—*continued.*

Plough d used.	Cost of Plough, Tackle, and Engine.	Approximate Cost per Acre.	Cost per Day, including Coal.	Acres per Day Ploughed or Cultivated.	REMARKS.
	£. s. d.	s. d.	£. s. d.	Acres.	
ler's	1065 0 0	Subsoiled 9 8 Dug 6 8 Ploughed 4 9 Cultivated 2 9	1 14 0	Subsoiled 3½ acres, dug 5 acres, ploughed 7 acres, cultivated 12 acres	"This is one of the most surprising examples yet seen of the virtue of deep steam tillage on a heavy soil."—p. 125. "But the immediate lesson is the certainty of profit to landowners from clearing away those vermine-filled banks and bird infested scrub fences, which are now choking up thousands of fine farms, and obstructing the progress of the fructifying steam-drawn share."—p. 125.
ards'	550 0 0	.. ..	1*l.* 8*s.* 5*d.*	8½ acres	"Steam has substituted for dead fallow, barley-seeds, wheat, roots, barley, or oats; seeds, beans, or peas, and wheat."—p. 127.
ards' e and ler's igh.	550 0 0	.. ..	1*l.* 10*s.* 0*d.*	6 acres	"The benefits of draining much increase by deep steam tillage. "Mr. Impy employed steam because he wanted more return from his land, and says he has not been disappointed." . . . "Mr. Impy is of opinion that steam is as much value to him on his light as on his heavy land."—p. 129.
ards'	585 0 0	14*s.* 0*d.*	1*l.* 15*s.* 9*d.*	5 acres	.. ..
ibers's	..	5*s.* to 7*s.*	1 15 6	6 to 7 acres	.. ..
ards'	463 10 0	.. ..	1 6 0	In spring 7 acres, autumn 8 to 10 acres	"The object for which Mr. Ruston bought the tackle is fully accomplished. This object is on his own high lands to get a crop every year, a fallow being formerly given every fifth year, and he expects by this present mode of management to keep his land as clean as when fallowed once in five years. The results of the two first years defray the whole cost of the apparatus, and now the land is as clean as it would have been under the old horse system."—p. 135. "On some of his own land he takes corn crops year by year successively where formerly a system of bare fallow prevailed."—p. 135.
:h's	490 0 0	.. ..	1*l.* 6*s.* 6*d.*	Cultivated 6½ acres, scarified 6 to 20 acres	"In 1861 so much improvement was experienced in the weight of the grain crops as to make it politic to abandon the 4-course, and adopt the 5-course system."—p. 137. "Would never more attempt to farm without steam."—p. 139. "One of the greatest advantages was that the drainage which had been undertaken earlier began to act much better. . . . It was soon found that the ridges could be turned down, and the crops grown on the flat."—p. 137.
ler's	1573 0 0	.. ..	1*l.* 8*s.* 0*d.*	Ploughed 5 to 9 acres, cultivated 10 to 16 acres.	.. ..
rards'	525 0 0	.. ..	1 8 10	Ploughed 5¾ acres, cultivated 7½ acres.	.. ..
rards' tivator y	550 0 0	7 0½	1 15 3	8 acres	"Mr. Palmer is perfectly satisfied with the result, and states that the Corn Bill is now 200*l.* a year less than it used to be."—p. 145. "The landlords, too, are far too fond of game to allow the wide, sprawling, irregular hedgerows to be grubbed up. . . . We listened to a strange tale about the combination of labourers to break up the machinery."—p. 145.

TABULATED STATEMENT as to STEAM PLOUGHING, from the JOURNAL o

By which Committee Visited.	Name of Farm.	Tenant.	Situation.	Size of Farm.	Na
				Acres.	
Mr. Reed's ..	.. ..	Mr. T. L. King	Thorpe Hall, Scole, Norfolk.	660	Mi
Mr. Reed's ..	.. ..	Mr. Kersey Cooper.	Bardwell, Bury St. Edmunds	800	Mo ra sti
Mr. Reed's ..	.. ..	Lord Leconfield	Petworth Park, Sussex	700	Sti
Mr. Reed's ..	.. ..	Messrs. R. and T. Wagstaff	Grays, Essex ..	1179	Li m m h
Mr. Reed's ..	.. ..	Messrs. Blyth and Squier	Stanford-le-Hope, Essex	400	Li
Mr. Reed's ..	.. ..	Mr. E. Fyson ..	Higham, Suffolk	950	Li
Mr. Reed's ..	.. ..	Mr. E. Greene, M.P.	Near Bury St. Edmunds.	400	Li
Mr. Reed's ..	.. ..	Mr. Smythe ..	Newsells Bury, Royston, Herts.	700	Mi
Mr. Reed's ..	.. ..	Mr. R. H. Ellman	Lamport, Sussex	1300	Li
Mr. Reed's ..	.. ..	Mr. J. Arnot ..	Carshalton, Surrey	600	Li
Mr. Reed's ..	.. ..	Mr. Cooper ..	Fen Drayton, St. Ives	500	

ɜRICULTURAL SOCIETY, VOL. III., SECOND SERIES, 1867—*continued.*

e Plough and le used.	Cost of Plough, Tackle, and Engine.	Approximate Cost per Acre.	Cost per Day, including Coal.	Acres per Day Ploughed or Cultivated.	REMARKS.
	£. s. d.	s. d.	£. s. d.	Acres.	
vards' & rrell's	721 7 10	8 8½	1 10 6	6¾ acres	Fields require to t hedges removed, and
ith's	594 10 0	3 4½	..	10 acres	"I certainly grow more corn, and make n
		from the land than I have ever done before, besides always being instead of the tail of my work." . . . . He feels that it improves the of a farm, deepens the interest of men in their work, and impels th towards mental development."—p. 157.			
wler's and wards'	1000 0 0 700 0 0	.. ..	1*l.* 9*s.* 2*d.*	Ploughed 5 acres, cultivated 6 to 8 acres	"Spoke of the inc obtained throughout and the greater promp which all tillage ope performed."—p. 159.
leman & orton's tivator, 'owler's oughs.	..	17*s.* 4*d.*	1 11 4	7 acres	"Mr. Wagstaff is fied with the efficie respect to increased
		the indispensable aid thus rendered him; with testifies to the greater bulk of all green crops, and to one quarter wheat in excess of what was customary as due to the employment o . . . ." Messrs. Wagstaff pursue the Market-garden system."—p. 159.			
wler's & wards' tivator	700 0 0 200 0 0	14*s.* to 16*s.*	..	Ploughed 3¾ acres, cultivated 4½ acres	"These gentlemen cidedly to the adoptic in preference to ho tion."—p. 166. "The tenants offe nation as to the amount of work done.
			£. s. d.		
wler's	600 0 0	.. ..	1 7 7½	Ploughed 8 acres, cultivated from 10 to 15 acres	"He affirmed th account would be fa steam.—p. 167.
vards', nsome's Burrell's	750 0 0	.. ..	..	7 to 8 acres.	.. ..
ith's	410 0 6	.. ..	1 4 0½	Ploughed 5 acres, cultivated 5 to 10 acres	"Mr. Smythe exp self as perfectly sa the results of steam would on no account farm without steam p. 172.
wler's	945 0 0	.. ..	..	Ploughed 6 acres, scarified 12 acres.	.. ..
wler's	881 0 0	.. ..	1 6 11	Ploughed 6 acres, cultivated 10 acres.	.. ..
wler's	945 0 0	.. ..	1 15 6	..	"Mr Cooper stat customers testify to
		of steam cultivation in the production of larger crops, and crops of bet —p. 180. "Mr. Cooper provides in every way for the comfort of his engine m We found him building an engineer's house on 4 wheels, with int sions 14 × 7 to hold 3 beds; fitted with cooking stove, and capable dating 3 men and 2 boys. It is constructed with two windows, a door ladder behind. The fabric is of wood, shielded by corrugated iron, a light that two horses or the engine can pull it."—p. 181.			

TABULATED STATEMENT as to STEAM PLOUGHING, from the JOURNA

Page in R.A.S.E. Journal.	By which Committee Visited.	Name of Farm.	Tenant.	Situation.	Size of Farm.	N
					Acres.	
186	Mr. Reed's ..	.. ..	Mr. W. L. Woods	Chilgrove, Chichester	345	
188	Mr. Reed's ..	.. ..	Mr. J. Lancashire	Micheldever, Hampshire	725	Li
191	Mr. Reed's ..	.. ..	Mr. Redman ..	Abbotstone, Arlesford, Hants	1100	Li
205	Mr. Clarke's	.. ..	Mr. J. F. Edwards	Eye, Peterborough	400	M
209	Mr. Clarke's	.. ..	Mr. J. Martin ..	Wainfleet, Lincolnshire	460	L
209	Mr. Clarke's	.. ..	Mr. F. Sowerby	Aylesby, Grimsby	900	M
212	Mr. Clarke's	.. ..	Mr. G. B. Skipworth.	Caistor, Lincolnshire	680	M
212	Mr. Clarke's	.. ..	Mr. T. B. Dring	Claxby, Spilsby, Lincolnshire	Between 800 and 900	M
[illegible]	Mr. Clarke	.	Mr. J. Sowerby, [illegible]un.	Beelsby, Grimsby	1500	M
[illegible]	[illegible]	[illegible]	[illegible] Sturge	Bewdley, Worcestershire	430	M
[illegible]	[illegible]	[illegible]	[illegible]	Shackerly, Al[illegible]ighton, Salop	350	L

ICULTURAL SOCIETY, VOL. III., SECOND SERIES, 1867—*continued.*

Plough id used.	Cost of Plough, Tackle and, Engine.	Approximate Cost per Acre.	Cost per Day, including Coal.	Acres per Day Ploughed or Cultivated.	REMARKS.
	£. s. d.		£. s. d.	Acres.	
h's	480 0 0	.. ..	..	8 acres	.. ..
ards'	370 0 0	.. ..	1 4 3	First time, 5 acres; second time, 6 or 7 acres	"He considers 500 acres of arable land the smallest quantity on which steam cultivation should be practised; would advise no one to go into it without intending to pay thorough personal attention to the machinery. If left to men it will be sure to be a failure."—p. 190.
ler's	..	.. ..	£. s. d. 1 9 0	..	.. ..
ler's	500 0 0	.. ..	..	5 to 8 acres	"The benefits of steam culture on this farm are easily summed up. In the first place 13 horses used to be kept upon 240 acres arable, and now 60 acres more have been brought under the plough. The force of horse-flesh due to the 300 acres arable is (at the same rate) about 16, but 9 horses only are now found sufficient for the work left undone by the engine."—p. 208. "Mr. Edwards's testimony is that the work is better done, the land is more forward, not so starved, and the crops are better. The greatest advantage is found upon his strongest land."—p. 208.
ler's	380 0 0	.. ..	..	Ploughed 7 acres, cultivated 10 acres.	.. ..
th's	..	.. ..	£. s. d. 1 9 6	..	"The drainage is improved, and the root crops are eaten off with somewhat more advantage."—p. 211.
rler's	900 0 0	.. ..	..	Ploughed 7 acres, cultivated 10 to 15 acres	"Mr. Skipworth estimates the general increase in the yield of his crops at 10 per cent. and more."—p. 212.
..	..	.. ..	..	6½ acres	"The crops have been more productive from being planted at the proper time, and none out of season."—p. 213.
wards'	520 0 0	.. ..	..	Cultivated 5 to 6 acres.	.. ..
wler's ckle	245 0 0	.. ..	..	Ploughed about 4 acres, cultivated 6 acres	"The steam tackle has just been turned to good account for getting in 12 acres of spring wheat after turnips, sheep fed early this month, the field was well cultivated in two days, and drilled on the third day by a Suffolk drill with harrows attached; the land has not been in working order for a single day since, even then its condition was such that the trampling of horses in doing the necessary tillage must have spoilt the seed-bed."—p. 215.
wards' ckle	470 0 0			..	"Mr. Pullen gets more green cropping than he used to do; his crops in general, he says, are more productive."—p. 216.

TABULATED STATEMENT as to STEAM PLOUGHING, from the JOURNAL

Page in R.A.S.E. Journal.	By which Committee Visited.	Name of Farm.	Tenant.	Situation.	Size of Farm.	M
					Acres.	
216	Mr. Clarke's	.. ..	Mr. W. J. Edmonds	Southrop, Lechlade, Gloucestershire	1200	M
219	Mr. Clarke's	.. ..	Mr. J. Walters	Bearwood Park, Wokingham, Berkshire	..	M
221	Mr. Clarke's	.. ..	Mr. J. Williams	Shippon, Abingdon	Over 600	
222	Mr. Clarke's	.. ..	His Grace the Duke of Marlborough	Blenheim Park, Oxon	Arable 760, and grass 1590	
225	Mr. Clarke's	Sandford ..	Mr. Miles Rodgett	Sandford, Wareham, Dorset	Between 400 and 500	L
225	Mr. Clarke's	.. ..	Mr. Peter Stevenson	Rainton, Ripon, Yorkshire	440	M
228	Mr. Clarke's	.. ..	Mr. F. W. Bignell	Loughton, Stony Stratford, Bucks	222	
232	Mr. Clarke's	.. ..	Mr. J. S. Crawley	Farley, Luton, Bedfordshire	About 600	S
232	Mr. Clarke's	.. ..	Mr. J. Horrell ..	Stevington, Bedford	..	

RICULTURAL SOCIETY, VOL. III., SECOND SERIES, 1867—*continued.*

Plough nd s used.	Cost of Plough, Tackle, and Engine.	Approximate Cost per Acre.	Cost per Day, including Coal.	Acres per Day Ploughed or Cultivated.	REM
	£. s. d.		£. s. d.	Acres.	
ler's	..	.. ..	..	Ploughed about 8 to 10 acres, cultivated from 15 to 25 acres	"Mr. Edmun his engine the amounts of p stiff land it pl acres a day; or 1 1 acre per hou and with shallo 6 inches depth. observed that th daily rate, the engine often ploughing 60 acres in a
rards'	616*l.*, and 100*l.* for new rope, &c., in 1865.	.. ..	..	..	"The main culture (thoug pointed out in th factory from the tation of produc
rards'	..	.. ..	..	Ploughed 4 to 5 acres, cultivated 5 to 10 acres	"Mr. Willian he would never cultivation on farm."—p. 222.
			£. s. d.		
wards'	541 0 0	.. ..	1 18 10¾	..	..
wards'	535 0 0	.. ..	..	Cultivated 6 to 8 acres	..
..	480 0 0	.. ..	..	Cultivated about 5 acres	"The weight is decidedly gr advantage of much more ea couch-grass.
		"Mr. Stevenson will *not* say that his corn crops yield more a sequence of steam cultivation; but he used to grow too much s uses less guano, and gets a more regular and upstanding crop."—			
..	190*l.*, and 60 for new rope	About £1 10*s.*	..	..	"Among the the drainage o clay (which ha done in every I is decidedly mo the deep stirri cultivator."—p.
handler d Oliver's kle, since estituted Smith's	590 0 0	.. ..	..	5 acres with small cultivator, 7 acres with larger one	"The crops g productive and attributable pa and partly to st —p. 232.
Stobey and).'s engine, and nith's indlass	590 0 0				
Howards'	..	.. ..	..	6 acres	..

TABULATED STATEMENT as to STEAM PLOUGHING, from the JOURNAL

Page in R.A.S.E. Journal.	By which Committee Visited.	Name of Farm.	Tenant.	Situation.	Size of Farm.	[illegible]
					Acres.	
234	Mr. Clarke's	.. ..	Messrs. J. & F. Howard	Bedford	445	H
239	Mr. Clarke's	.. ..	Mr. J. C. Robinson	Stevington, Bedford	600	M
241	Mr. Clarke's	.. ..	Mr. W. Lavender	Biddenham, Bedford	550	St
242	Mr. Clarke's	.. ..	Rev. J. W. C. Campion	Westoning, Woburn, Bedford	500	St
242	Mr. Clarke's	.. ..	Mr. J. Bartlett	Whitfield, Brackley, Northamptonshire	..	
244	Mr. Clarke's	.. ..	Mr. T. Revis ..	Olney, Bucks ..	800	M
245	Mr. Clarke's	.. ..	Mr. J. Turner	Haddon, Yaxley, Huntingdonshire	430	S
[illegible]	Mr. Clarke's		M[illegible]en Wallis	Overstone, Northampton	375	M
[illegible]	[illegible]		[illegible]	Stanion, Thrapston, Northamptonshire	725	S
[illegible]	[illegible]		[illegible]	[illegible]ingbury, Wellingborough, Northampton	970	S

IAL AGRICULTURAL SOCIETY, VOL. III., SECOND SERIES, 1867—*continued.*

	Whose Plough and Tackle used.	Cost of Plough, Tackle, and Engine.	Approximate Cost per Acre.	Cost per Day, including Coal.	Acres per Day Ploughed or Cultivated.	REMARKS.
		£. s. d.		£. s. d.	Acres.	
	Howards'	540 0 0	.. ..	0 14 2	..	"The stubbles every showed well, the heaviest w being after potatoes, and sown in a steam cultivated seed-bed."—p. 237. "We have remarked in our tour how few employers of steam apparatus ad new system of culture along with the new power. In many, or rather in cases, the rotation of crops is altered; but in comparatively few instances di find anything like so great a change in the tillage operations themselves as pr nent advocates of steam culture have recommended."—p. 237-8.
	Howards'	505 0 0	.. ..	..	5 to 7 acres	.. ..
	Smith's	..	.. ..	..	Cultivated from 14 to 20 acres	"His verdict is that a horsed land, if on a good farm should be steamed, a he were now without a s cultivator he would buy o morrow."—p. 242. "Twenty horses were formerly kept. Some years ago the number was re to 14.
	Howards'	500 0 0	.. ..	..	Cultivated 7 to 8 acres	"He has increased the ac of his root crop; and al crops, with the exception c wheat crop, have been more productive."—p. 242. "The force of horses has been reduced from 22 before to 16 now."—p.
	Hayes' ..	..	.. ..	..	Cultivated 5 to 8 acres.	.. ..
)	Howards'	470 0 0	.. ..	..	..	"Mr. Revis says, I think the crops are improved by cultivation, no person's look better than mine this season (1866)."—p
2	Howards' tackle and Fowler's ploughs	405 0 0	.. ..	..	Ploughed 4 acres, cultivated 7 acres	"His crops generally ar more productive; though t not entirely due to the mech tillage, seeing that much art food and manure have been for years, doubtless with lizing effects."—p. 246. "'The drainage of this heavy land is certainly more effectual,' while ' ordinary dry season," says Mr. Turner, "root crops can now be eaten off w without steam, they could not be grown.'"—p. 246.
1	Fowler's	..	.. ..	..	..	"The old broad high have been gradually lov and now 'the water sinks away better,' after the steam work than after ploughing."—p. 249.
1	Howards'	470 0 0	.. ..	..	..	"Mr. Pell is of opinior by the introduction of tillage, his grain-crops have become more productive to the extent of 6 bushe acre more than they were before."—p. 250.
1	Fowler's	945 0 0	.. ..	..	Ploughed 5 or 6 acres, cultivated 8 to 11 acres	"Broad lands common district, but not thrown up high, have been graduall duced to the flat without i to cropping, and without m ally affecting the drainag cepting that this is now more effectual."—p. 252-3. "The ability to work this strong land at the best time—that is in dry w and in autumn—has given a generally increased yield to the crops."—p. 253

TABULATED STATEMENT as to STEAM PLOUGHING, from the JOURN

in .E. al.	By which Committee Visited.	Name of Farm.	Tenant.	Situation.	Size of Farm.
1	Mr. Clarke's	.. ..	Mr. F. Eddison	North Laiths, Ollerton, Notts.	414
4	Mr. Clarke's	.. ..	Mr. H. Hemsley	Harlaxton, Grantham	486
3	Mr. Clarke's	.. ..	Mr. E. Paddison	Ingleby, Lincoln	720
3	Mr. Clarke's	.. ..	Mr. J. R. Ealand	Aisthorpe, Lincoln	880
1	Mr. Clarke's	.. ..	The Right Hon. Lord Sudeley	Torrington, Winchcombe, Cheltenham	260
1	Mr. Clarke's	.. ..	Mr. E. Holland, M.P.	Dumbleton Hall, Evesham	750
4	Mr. Clarke's	.. ..	Mr. C. Randell	Chadbury, Evesham, Worcestershire.	650
1	Mr. Clarke's	.. ..	Mr. Peter Davis	Bickmarsh Hall, near Alcester, Warwickshire	975
2	Mr. Clarke's	.. ..	Mr. B. Bomford	Pitchill (Warwickshire), near Evesham	1200
3	Mr. Clarke's	.. ..	Mr. J. M. Read	Elkstone, Cheltenham	1036
3	Mr. Clarke's	.. ..	Mr. J. Higginbottom	Pensax Court, Tenbury, Worcestershire	1100
3	Mr. Clarke's	.. ..	Mr. J. E. Stanier	Uppington, Wellington, Shrop-	280

RICULTURAL SOCIETY, VOL. III., SECOND SERIES, 1867—*continued.*

Plough nd e used.	Cost of Plough, Tackle, and Engine.	Approximate Cost per Acre.	Cost per Day, including Coals.	Acres per Day Ploughed or Cultivated.	REMARKS.
	£. s. d.		£. s. d.	Acres.	
ler's	..	.. ..	..	Cultivated 16 or 17 acres.	.. ..
rards'	422 4 0	.. ..	..	..	"He does not report any special augmentation in the produce of roots; but says that a general increase of yield marks his crops, and that he believes steam cultivation, which means better cultivation, to be the cause."—p. 255.
ler's	950 0 0	.. ..	..	Cultivated 7 to 15 acres.	.. ..
ler's	970 0 0	.. ..	..	..	"I am quite satisfied that much more produce can be obtained by steam power than by horses at any cost on *strong land*."—p. 258. "I would not be without it for any money."—p. 258.
rards'	968 0 0	.. ..	..	Ploughed 3½ acres, cultivated 4½ acres.	.. ..
rler's	830 0 0	10*s.* 7*d.*	£. s. d. 2 11 10	Ploughed 5 to 7 acres, cultivated 7 to 10 acres	"By my own experience, and by comparing notes with other steam power employers in this locality, I think it may be said, that the increase per acre attributable to steam cultivation may be put at 8 bushels."—p. 263.
wler's ugh and ith's kle	530 0 0	6*s.* 8*d.* to 8*s.* 10*d.*	1 6 8	Cultivated 4 to 6 acres.	"The grand thing in steam culture," said Mr. Randall," is being able to take advantage of favourable weather for tillage, and more particularly in the autumn culture roots and cabbage."—p. 269. "So I come to the conclusion that there is good in all; Smith's for real hard work; Howard's for crossing Smith's work, Fowler's for doing that which they cannot do. I have them all."—p. 270.
wards' kle and wler's ughs	635 0 0	.. ..	..	Ploughed 3½ acres, cultivated 7 acres.	.. ..
wler's, extra ivator Howard	1200 0 0	.. ..	£. s. d. 3 17 0	..	"So palpable are the benefits of early tillage that Mr. Bomford wants to get all his autumn ground broke up within a fortnight or three weeks, which the present 'set' is unable to compass, and therefore he was buying another to help it"—p. 274. "But he speaks of a decided augmentation of yield per acre. He is 'sure of better crops,' which in itself expresses a great deal, when uncertainty is one great element in a clay-land farmer's misfortunes."—p. 275.
tson's Hewit-'s.	..	.. ..	..	..	.. ..
wards'	900 0 0	.. ..	..	..	.. ..
wards'	690 0 0	.. ..	..	..	"Even the most sceptical of my neighbours now no longer doubt the numerous advantages of steam over horse power."—p. 279. "He further writes of the great value of Howard's steam-harrows, which do 20 to 25 acres per day."—p. 279.

TABULATED STATEMENT as to STEAM PLOUGHING, from the JOURNAL

Page in R.A.S.E. Journal.	By which Committee Visited.	Name of Farm.	Tenant.	Situation.	Size of Farm.
					Acres.
279	Mr. Clarke's	.. ..	Mr. H. R. Corbet	Adderley, Market Drayton	400
280	Mr. Clarke's	.. ..	Mr. T. Nock ..	Sutton Maddock, Shiffnall, Shropshire	550
280	Mr. Clarke's	.. ..	Mr. H. H. Tracey	Gregynog, Newtown, Montgomeryshire	106
281	Mr. Clarke's	.. ..	Mr. V. Gosford	Tanylan, Holywell, Flintshire	514
283	Mr. Clarke's	.. ..	Mr. J. A. Williams	Baydon, Wilts	290
286	Mr. Clarke's	.. ..	Mr. Matthew Savidge	Chipping Norton, Oxfordshire	560
291	Mr. Clarke's	.. ..	Mr. R. Craddock	Lyncham, Chipping Norton	530
292	Mr. Clarke's	.. ..	Mr. R. Hewer ..	Fair Green, Chipping Norton	740
292	Mr. Clarke's	.. ..	Mr. G. Pocock	Bourton, Shrivenham, Wilts	450
295	Mr. Clarke's	.. ..	Mr. Edmund Ruck	Cricklade, Wilts	720

ɪRICULTURAL SOCIETY, VOL. III., SECOND SERIES, 1867—*continued.*

e Plough and le used.	Cost of Plough, Tackle, and Engine.	Approximate Cost per Acre.	Cost per Day, including Coal.	Acres per Day Ploughed or Cultivated.	REMARKS.
	£. s. d.		£. s. d.	Acres.	
rler's	852 0 0	.. ..	..	..	.. ..
vards'	500 0 0	.. ..	..	..	.. ..
vards'	..	.. ..	..	..	.. ..
vards'	672 0 0	.. ..	..	..	"I have no hesitation in saying that the farm is in course of progressive improvement, entirely attributable to steam cultivation."—p. 281.
rler's	350 0 0	.. ..	..	Ploughed 5 to 6 acres, cultivated 10 to 12 acres	"They have had no difficulty or mess with the engine on wet or soft land. If the wheels begin to skid they are not allowed to 'burrow like rabbits,' but the engine is stopped, and stones picked off the land are put in the holes before the wheels, or else pieces of wood which are carried along with the engine for this purpose."—p. 284. "Five out of the 11 horses formerly kept have been displaced. Then the drainage is improved."—p. 285.
vler's	600 0 0	.. ..	..	..	"Mr. Savidge now works 9 horses upon his farm, which consists of 380 acres of arable and 180 acres of pasture; but before the engine came he ploughed with a gang of 12 oxen, or rather of 16, in addition to the 9 horses. All the former expenses connected with these 16 bullocks he now keeps in his pocket, or rather *the money* is available for *something* else."—p. 288. "The 380 acres of arable lies in large fields, averaging 30 to 40 acres each, with low fences and few trees."—p. 289.
wler's	780 0 0	.. ..	..	Ploughed 5 to 6 acres, cultivated 8 to 10 acres	"Before the introduction of steam power, 12 horses and 8 or 10 bullocks were worked; 'now the bullocks are dispensed with, and 8 or 9 horses do the work easily.'"—p. 292. "The crops generally are more productive, the straw growing much stiffer, it is less liable to go down.—p. 292.
wler's	400 0 0	.. ..	..	..	.. ..
wler's nd 'ocock's.	750 0 0	7*s.* 10*d.*	..	Cultivated 8 to 16 acres, ploughed 6 acres	"Mr. Pocock states that in the absence of steam-tackle he would require 12 horses more than he has now, and at 44*l.* each the saving is 528*l.*—p. 294-5. "Mr. Pocock's arable is all heavy land and very hard to work. Still it does not look lumpy, and he explains that this is because the character of the staple has been materially altered by the absence of trampling and the deeper steam tillage."—p. 295.
wler's	..	5*s.* 0*d.* 2*s.* 6*d.*	..	Ploughed 8 acres, scarified 16 acres	As to effects upon the farm the staple soil formerly 5 inches in depth is now 7 or 8 inches deep; a considerably increased head of stock is kept, owing to the larger production of green keeping and roots."—p. 298. "Mr. Ruck can never be persuaded to go back to the old slow horse system, with all its trouble and scamping of work."—p. 298.

TABULATED STATEMENT as to STEAM PLOUGHING, from the JOURN.

Page in R.A.S.E. Journal.	By which Committee Visited.	Name of Farm.	Tenant.	Situation.	Size of Farm.
					Acres.
299	Mr. Clarke's	.. ..	Mr. Pearce Brown	Burderop, Swindon, Wilts	1000
300	Mr. Clarke's	.. ..	Mr. J. Stratton	Salthorpe, Swindon, Wilts	1000
301	Mr. Clarke's	.. ..	Mr. G. Barnes, agent for Mrs. S. C. Hawkins	Alton Pancras, Dorchester	700
301	Mr. Clarke's	.. ..	Mr. H. Parsons	Hazelbury, Crewkerne, Somerset	1700
303	Mr. Clarke's	.. ..	Mr. William Bethell	Rise Park, Hull	280
304	Mr. Clarke's	.. ..	Mr. Samuel Strickland	Headley Hall, Tadcaster, Yorkshire	300
306	Mr. Clarke's	.. ..	Mr. H. Hawking	Ellinthorpe, Borobridge, Yorkshire	225
309	Mr. Clarke's		The Hon. Payan Dawnay	Beningbrough Hall, York	1000
[illegible]	[illegible]		Mr. J. Wilson ..	Morpeth, Northumberland	450
	[illegible]		Mr. S. Langdale	High Espley, near Morpeth	600
	[illegible]		The Right Hon. Lord Vernon	[illegible] Morpeth	994

GRICULTURAL SOCIETY, VOL. III., SECOND SERIES, 1867—*continued.*

ɜe Plough and ɜle used.	Cost of Plough, Tackle, and Engine.	Approximate Cost per Acre.	Cost per Day, including Coal.	Acres per Day Ploughed or Cultivated.	REMARKS.
	£. s. d.		£. s. d.	Acres.	
wler's	..	.. ..	..	Ploughed from 4 to 10 acres	.. ..
wler's	..	.. ..	..	Ploughed 5 to 10 acres, cultivated 10 to 20 acres	"Mr. Stratton is enabled to crop oftener and in better season."—p. 301.
wards'	600 0 0	.. ..	..	Cultivated 5 to 9 acres	"They formerly worked 32 horses, but since the cultivation began only 22 horses are kept.—p. 301. "Mr. Barnes finds the drainage quickened."—p. 301.
wler's	..	.. ..	..	Ploughed 4 to 8 acres, cultivated 6 to 14 acres	"Mr. Parsons considers that the drainage is more effectual, and that his crops are generally more productive.'—p. 301.
wler's	..	.. ..	..	..	"The bailiff, who has been here eight years, and therefore ought to know, affirms that the three years of steam tillage have given a decided increase in the yield of corn, and this on a farm that was 'well done' before the steam power came."—p. 304.
ɔwler's	612 16 0	.. ..	..	Ploughed 4 acres, cultivated 20 acres	"By steam cultivation, Mr. Strickland has been enabled to grow a larger breadth of root crops, and to take green crops every alternate year."—p. 305. "I am an old man, but I would give Lord Headly notice to quit, if I might not or could not have a steam plough. . . . Used to keep 14 farm horses, now has only 8."—p. 306.
owler's	..	.. ..	..	Ploughed 6 acres, cultivated 10 to 12 acres	"Pronounces steam cultivation to be superior to all other systems upon well drained land."—p. 309.
owler's	700 0 0	.. ..	..	Cultivated 7½ acres	.. ..
owler's	1300 0 0 [2 engines].	.. ..	..	Ploughed 7⅔ acres, cultivated 12⅔ acres	"I find I can grow turnips on land upon which they were never grown before."—p. 314. In other words, the new plan * is capable of working as large an area in two hours as the old plan can do in three hours; or in other words, again, you may henceforth get your six weeks' work of autumn tillage finished in four weeks, and for much less money, because while there is an additional ploughman with slight increase in the coal, oil, and water-bill, you have only two-thirds the number of days on which any expense at all has to be incurred."—p. 319. [* *i. e.* the "double double" or half-way system.]
ɔwards'	800 0 0	.. ..	..	Ploughed 5 acres, cultivated 7 acres	"The crops generally have been more productive, and Mr. Langdale says, 'I find manures to act better.'"—p. 320.
'owler's ı pair of 'owler's ngines)	1040 0 0	.. ..	..	Ploughed 7 acres, cultivated 8½ acres.	.. ..

TABULATED STATEMENT as to STEAM PLOUGHING, from the JOUR

Page in. R.A.S.E. Journal.	By which Committee Visited.	Name of Farm.	Tenant.	Situation.	Size of Farm.
					Acres.
324	Mr. Clarke's	.. ..	Mr. David Wright	Beal, Northumberland	800
328	Mr. Clarke's	.. ..	Mr. Thomas Begbie	Queenston Bank, Drem, Haddingtonshire	..
328	Mr. Clarke's	.. ..	Mr. W. Sadler	Ferrygate, Dirleton, Drem.	409
329	Mr. Clarke's	.. ..	Mr. George Hope	Fenton Barns, Drem	670

STEAM PLOU

Page in R.A.S.E. Journal.	By which Committee Visited.	Name of Farm.	Tenant.	Situation.	Size of Farm.
					Acre.
331	Mr. Clarke's	.. ..	Mr. Newton ..	Kidlington, Woodstock;	500
			Mr. T. Taylor	Shipton-on-Churwell, Woodstock	750
335	Mr. Clarke	Two Farms ..	Mr. S. Druce ..	Abbey Farm, Eynsham;	700
			Mr. J. Druce ..	Twelve Acre Farm, Eynsham, Oxfordshire	
336	Mr. Clarke's	Two Farms ..	Mr. William Bulstrode.	Cookham Dean, Berks;	600
			Mr. J. M. Gurney	Pinkneys Farm, Cookham.	
343	Mr. Clarke's	Four Farms ..	Mr. E.W. Browne	Langton, Wragby, Lincolnshire;	2400
			Mr. W. Lacy ..	Panton	
			Mr. Christopher Robson	Tuphol ..	

RICULTURAL SOCIETY, VOL. III., SECOND SERIES, 1867—*continued.*

Plough nd e used.	Cost of Plough, Tackle, and Engine.	Approximate Cost per Acre.	Cost per Day, including Coal.	Acres per Day Ploughed or Cultivated.	REMARKS.
	£. s. d.		£. s. d.	Acres.	
rler's	950 0 0	.. ..	..	Ploughed 7 acres, cultivated 12 acres	"After steam culture the land dries better and sooner, though root crops are never attempted to be fed off."—p. 326.
rler's	..	.. ..	..	..	"Mr. Begbie considers that his root crops show a considerable augmentation of produce, though he has not tested steam against horse work in the same field."—p. 328.
rler's	..	.. ..	..	..	.. ..
wards'	..	.. ..	..	..	"Mr. Hope considers that he is well repaid for his investment, by the deeper and better tillage, and by the winter-exposed land being sooner ready for sowing in spring."—p. 329.

RTNERSHIPS.

se Plough and kle used.	Cost of Plough, Tackle, and Engine.	Approximate Cost per Acre.	Cost per Day, including Coal.	Acres per Day Ploughed or Cultivated.	REMARKS.
	£. s. d.		£. s. d.		
wler's, and dding-'s wind-lass.	786 0 0	6s. 6d. to 8s. 6d.	..	Cultivated 9 to 12 acres	"The land drains better; the root crops are better, and as a consequence the barley, and indeed all the corn crops are better."—p. 334.
ith's	..	.. ..		..	.. ..
vards'	553 10 0	7s. 5d.	..	..	"The total annual saving in draft animals effected by the steam-tackle is 8 horses at 44*l.* or 352*l.* The whole yearly outlay being 151*l.*, the net gain must be 201*l.*—p. 339.
		"We commend this little bit of arithmetic to occupiers of small fields, and ask them how they can possibly get the full profit out of a steam apparatus until their landlords enable them to grub up the hedgerows, now preventing the implement from making 400 yards long instead of 200 yards long furrows.'.—p. 341.			
ler's	1496 0 0	.. ..	..	Ploughed 6 to 8 acres, cultivated 15 to 20 acres	.. ..

TABULATED STATEMENT as to STEAM PLOUGHING, from the JOURNAL

Page in R.A.S.E. Journal.	By which Committee Visited.	Name of Farm.	Tenant.	Situation.	Size of Farm.
					Acres.
344	Mr. Clarke's	Four Farms ..	Mr. R. Kay ..	Stanwick ..	1200
			Mr. Samuel Rowlandson	Newton Morrell	
			Mr. Luke Seymour	Aldborough ..	
			Mr. Smurthwait	Holme House, Darlington, Yorkshire	

STEAM PLOUGHING BY THE HIRING S

Page in R.A.S.E. Journal.	By which Committee Visited.	Name of Farm.	Tenant.	Situation.	Size of Farm.
					Acres.
351	Mr. Clarke's	.. ..	Mr. J. Smith ..	Louth, Lincolnshire	..
354	Mr. Clarke's	.. ..	Mr. Henry Yates	Abbey Street, Derby	..
355	Mr. Clarke's	.. ..	Mr. W. Bellhouse	Escrick, York	..
356	Mr. Clarke's	.. ..	Mr. C. Hill ..	Dogsthorpe, Peterborough	..
356	Mr. Clarke's	.. ..	The Earl of Ducie	Chipping Norton, Oxon	..
358	Mr. Clarke's	.. ..	Mr. T. Colsey, agent to Lord Sudeley	Toddington ..	..

DIVIS

		Name of Company.		
359	Mr. Clarke's	The Herefordshire Steam Cultivating Company (Limited). Gen. Manager, Mr. J. Phillips-Smith.	Hereford	..
360	Mr. Clarke's	The Herefordshire Steam Cultivating, Thrashing, and General Implement Company (Limited).	.. ..	..
361	Mr. Clarke's	The West Riding (Yorkshire) Steam Ploughing, Cultivating, and Thrashing Company (Limited). Sec., Mr. C. Clay, Wakefield.	.. ..	..

L AGRICULTURAL SOCIETY, VOL. III., SECOND SERIES, 1867—*continued.*

Whose Plough and Tackle used.	Cost of Plough, Tackle, and Engine.	Approximate Cost per Acre.	Cost per Day, including Coal.	Acres per Day Ploughed or Cultivated.	REMARKS.
	£. s. d.		£. s. d.		
Fowler's	885*l.*, and 250*l.* for additions	3*s.* 6*d.* to 18*s.* 6*d.*	..	Ploughed 3 to 8 acres, cultivated 10 to 16 acres	"As to results of stea he thinks that the d much assisted from the breaking up of the and he thinks that the treading with sheep better than it used to do "Mr. Seymour's testi

that he could plough more cheaply by horses, and that steam had not im crops a bit. But he confessed that his land was entirely unsuited for st vation, and that rock and innumerable stones had proved a sore tri machine."—p. 341.

ION I.—PRIVATE OWNERSHIP.

	Whose Plough and Tackle used.	Cost of Plough, Tackle, and Engine.	Approximate Cost per Acre.	Cost per Day, including Coal.	Acres per Day Ploughed or Cultivated.	REMARKS.
		£. s. d.		£. s. d.		
	Fowler's	..	10*s.* 6*d.*	..	Cultivated 18 acres.	.. ..
	2 double sets of Fowler's	..	.. ..	..	..	.. ..
	Fowler's	1300*l.*, and 170*l.* for additions.	.. ..	..	..	.. ..
3	Fowler's	..	.. ..	..	..	.. ..
3	Fowler's	900 0 0	.. ..	..	Ploughed 6 acres, cultivated 8 acres	"Mr. Andrews (Ea agent), says that the d strong land has been more effectual by th steam; the acreage, ar larly the weight per ac crop have been increased."-
	Howards'.	..	.. ..	..	..	.. ..
PANIES.						
	2 sets of Howards'.	..	.. ..	..	..	.. ..
5	Howards'.	..	.. ..	..	..	.. ..
3	Fowler's.	..	.. ..	..	..	.. ..

TABULATED STATEMENT as to STEAM PLOUGHING, from the JOURNAL

Page in R.A.S.E. Journal.	By which Committee Visited.	Name of Farm.	Tenant.	Situation.	Size of Farm.
					Acres.
374	Mr. Coleman's	.. ..	Mr. Pease ..	St. Helen's, Bishops Auckland, Durham	440
376	Mr. Coleman's	Toft's Farm ..	The Lord Zetland	Near Saltbourn by the Sea	300
379	Mr. Coleman's	.. ..	Lord Durham; agent, Mr. Steward	Lambton ..	400
382	Mr. Coleman's	.. ..	Mr. W. Lawson	Baggrow, Westmoreland	380
386	Mr. Coleman's	.. ..	Messrs. Carrs ..	Carlisle	390
387	Mr. Coleman's	.. ..	Messrs. Nicholson	Kirby Thore, Westmoreland	780
390	Mr. Coleman's	.. ..	Mr. R. Neilson	Halewood, near Liverpool	300
393	Mr. Coleman's	.. ..	Mr. Horrocks ..	Toxteth Park, Liverpool	260
393	Mr. Coleman's	.. ..	The Whitchurch (Salop) Steam Cultivation Company; Manager, Mr. R. T. Smith		..
398	Mr. Coleman's	..	The Market Drayton Steam Cultivation Company (Limited); Manager, Mr. A. Gower		..

ıRICULTURAL SOCIETY, VOL. III., SECOND SERIES, 1867—*continued.*

e Plough and le used.	Cost of Plough, Tackle, and Engine.	Approximate Cost per Acre.	Cost per Day, including Coal.	Acres per Day Ploughed or Cultivated.	REMARKS.
			£. s. d.	Acres.	
vler's	840*l.*, and 292*l.* for additions and repairs	.. ..	..	..	"It is, we think, evident that from the nature of the soil, and the comparative small area for cultivation, together with the breakages which occurred, that steam cultivation has not proved remunerative at St. Helen's; from this example we may fairly infer that land sufficiently light to be ploughed by a pair of horses, and not of a nature to be seriously injured by horse pressure, will hardly pay for expensive steam-tackle, unless its area be very much more extensive than that at St. Helen's."—p. 376.
	£. s. d.		£. s. d.		
vler's and sskill's	1165 19 5 and 474*l.* 15*s.* 3*d.* for repairs, &c.	15*s.* 8*d.*	4 8 3¼	..	"Three horses out of 11 originally kept have been dispensed with, and the account should be credited with their full cost, which on such land cannot be estimated at less than 50*l.* a year."—p. 379.
			£. s. d.		
vler's	875*l.*, and 170*l.* for additions	.. ..	2 19 9	Ploughed 3 to 6 acres, cultivated 10 acres.	.. ..
vler's	915*l.*, and 188*l.* 15*s.* for replacements, &c.	.. ..	..	..	"Up to the present time Mr. Lawson has thrown himself into steam culture rather as a pioneer in the path of enterprise, willing to adventure something in the cause of progress, than as a farmer who has an eye to profit. The nature of the land both as being very hilly and full of awkward stones, and a want of a greater area to act upon, will partly account for the unfavourable result. It should be mentioned also that the climate is very moist, the annual rainfall being about 38 to 40 inches."—p. 386.
			£. s. d.		
wards'	550 0 0	.. ..	2 14 6	Cultivated about 5 acres.	.. ..
wards'	510 0 0	8*s.* 3½*d.*	2 1 6	..	.. ..
vler's	1000 0 0	.. ..	..	10 to 12 acres	.. ..
vards'	700 0 0	.. ..	..	..	.. ..
·ler's	1608 13 ·3	.. ..	..	..	"The financial operations of the Company have not been hitherto successful."—p. 397.
·ards'	1590 5 2	.. ..	..	..	"When the apparatus first started there was plenty of work to do; but farmers got tired of waiting, and set to work with their horses."—p. 399. "Not considered 'as affording fair experience of steam cultivation by the aid of a Company.'" —p. 400.

TABULATED STATEMENT as to STEAM PLOUGHING, from the JOURNA

Page in R.A.S.E. Jonrnal.	By which Committee Visited.	Name of Farm.	Tenant.	Situation.	Size of Farm.
					Acres.
400	Mr. Coleman's	.. ..	Lord Hatherton	Teddesley, near Stafford	400
401	Mr. Coleman's	.. ..	The Marquis of Anglesey	Sinia Park, Burton-on-Trent	165
403	Mr. Coleman's	.. ..	Mr. Wilson ..	Newlands, near Mansfield	900
406	Mr. Coleman's	.. ..	The Duke of Portland	Carburton, Notts.	2000
408	Mr. Coleman's	.. ..	Capt. Saville ..	Rufford, Ollerton, Notts.	699
409	Mr. Coleman's	.. ..	The Right Hon. the Speaker; tenant, Mr. Wilkinson	Crow Park Farm, Sutton, Notts.	400
411	Mr. Coleman's	.. ..	Mr. Grosvenor Hodgkinson, M.P.	Balderton, Newark	680
412	Mr. Coleman's	.. ..	Mr. Fisher ..	Orston, Elton, Notts	350

ɜRICULTURAL SOCIETY, VOL. III., SECOND SERIES, 1867—*continued.*

e Plough and :le used.	Cost of Plough, Tackle, and Engine.	Approximate Cost per Acre.	Cost per Day, including Coal.	Acres per Day Ploughed or Cultivated.	REMARKS
	£. s. d.		£. s. d.	Acres.	
ith's	Estimated at 500 0 0	.. ...	1 19 3½	..	"Mr, Wootton considers the advantage of steam so manifest that he would be quite willing to take the tackle at a valuation, supposing he were about to become tenant of the farm, even if the proportion of arable land was only 300 acres, which he thinks the minimum for steam cultivation."—p. 401.
		s. d.	£. s. d.		
wards'	About 700 0 0	10 7	2 18 10¾	Cultivated 5 to 6 acres	.. ..
wler's	860*l.*, and 21*l.* 15*s.* for additions	14 0½ 6 3	2 16 2 ..	Ploughed 4 acres, cultivated 9 acres (estimated)	"The quantity of work per day is small. It is true this is only an estimate; but in every case where verification was possible, we have found the estimate to exceed the reality, and therefore we believe it is fair."—p. 405.
›wards' ckle, ichard-n and arley's ıgine	500 0 0	.. ..	3 4	Ploughed 5 to 7 acres, cultivated 12 acres.	"The engine has proved very unsatisfactory; the repairs for the first three years being enormous."—p. 406. "Despite the extraordinary outlay for repairs, we have a large profit on the apparatus, which we may anticipate to see increased in future seasons."—p. 407.
›wler's	958 0 0	3 5	2 4 6	Ploughed 6 acres, cultivated 10 acres.	"Ten horses have been displaced, the cost of which cannot be estimated as less than 450*l.*, therefore the use of steam at Rufford has resulted in a clear saving of at least 250*l.* per annum."—p. 409.
ayton Shuttle-rorth's ngine, mith's ackle	520 0 0	7 2	2 4 9¾	..	"Now this appears to us an exceedingly satisfactory result, here is a farm taken in hand after years of mismanagement; draining, and buildings done without extra horse power, the land cleansed in a manner, and with an expedition that with horses alone would have been impossible; those who knew the land formerly are astonished at the result."—p. 410.
			£. s. d.		
›wler's	..	.. ..	3 8 3	..	.. ..
ayton Shuttle-·orth's ngine, ›wards' ıckle	550 0 0	.. ..		..	.. ..

TABULATED STATEMENT as to STEAM PLOUGHING, from the JOUR

Page in R.A.S.E. Journal.	By which Committee Visited.	Name of Farm.	Tenant.	Situation.	Size of Farm.
					Acres.
414	Mr. Coleman's	.. ..	Mr. Hemsley ..	Shelton, Newark	138
418	Mr. Coleman's	.. ..	Lord Archibald St. Maur; bailiff, Mr. Mountstephen	Walton, Loughborough	600
419	Mr. Coleman's	.. ..	Mr. Pacey ..	Garthorpe, Melton Mowbray	692
421	Mr. Coleman's	.. ..	Lord Berners ..	Keythorpe Hall	380

CULTURAL SOCIETY, VOL. III., SECOND SERIES, 1867—*continued.*

Plough d used.	Cost of Plough, Tackle, and Engine.	Approximate Cost Per Acre.	Cost per Day, including Coals.	Acres per Day Ploughed or Cultivated.	REMARKS.
ford Co.'s ine. ards' tle	£. s. d. 500 0 0 [Engine 300*l.* Tackle 200*l.*]	9*s.* 6*d.*	£. s. d. 3 12 5½	..	"Such a favourable result on so small an area is only rendered possible by the economical use of steam power for other purposes; and we come to conclusions that. . . . from 250 to 300 acres of arable land is the smallest area on which it would be prudent to employ steam cultivation."—p. 418.
ards'	..	.. ..	£. s. d. 2 9 8	..	"Mr. Mountstephen considers the effects of steam culture so beneficial that he would not hesitate, if occupying the farm as tenant, to take the apparatus at a valuation. It is his opinion that 300 acres arable is the minimum area on which steam could be profitably employed, supposing that the engine is used for thrashing purposes."—p. 419.
ler's	..	.. ..	..	..	.. ..
ards' igh. ler's vator, h and by's ting ows	798 15 1	15*s.* 4*d.*	£. s. d. 3 0 8	..	.. ..

LESSONS DERIVABLE FROM THE REPORTS.

At a Meeting of the Weekly Council of the ROYAL AGRICULTURAL SOCIETY *held on the 29th of May,* Mr. THOMPSON (the President) said he had undertaken to open the discussion, not with the view of delivering a lecture upon steam cultivation, because he hoped their time would be much better spent than in listening to the opinions of any one man upon a topic so extensive, but for the purpose of making, in the first place, a few remarks upon the reports themselves, and then throwing out one or two propositions, or rather questions, for consideration by the meeting.

First, then, a few words about the reports themselves.

As one of those who took an active part on the committee appointed to organise an inquiry into the present state of steam cultivation on an extensive scale, I feel great pride and gratification in seeing laid before the Society, in the course of twelve months, such ample and excellent reports upon this important question. The duty undertaken by the Commissioners was very onerous, but they have carried it out in spite of many difficulties, and have displayed great talent in the way in which they have completed the task. That they should have persevered, notwithstanding a most unfavourable season, during which the weather caused delay in all the operations of husbandry during the summer and autumn, and prevented steam implements from being brought into use, as in any ordinary season, was only what was expected from men possessing the spirit of true Englishmen. That they should have collected such a valuable mass of materials was only the natural reward of their patience and perseverance. But when we come to look at the reports themselves, and see that, while they contain a great mass of details, involving continual comparison and repetition (without which, indeed, the returns would have lost a large portion of their value), they at the same time come before us as a really readable volume, constituting consecutive narratives, I do say that it is a proof of literary merit of no common kind. Permit me, therefore publicly, on behalf of the Society, to offer our best thanks to the Commissioners for the zeal with which they have undertaken a most difficult duty, for the perseverance with which they have carried it out in spite of numerous difficulties, and for the great ability and talent with which they, especially those gentlemen to whom was entrusted the work of preparation, compiled reports that will no doubt be read with interest in all parts of the civilised world.

Having thus unmistakeably given my own opinion upon the character of these reports, I would briefly allude to some remarks I have occasionally heard, expressive of a little disappointment that they do not contain certain things which the objectors hoped and expected to find in them, but which I wish to show could not properly have been inserted.

I have heard it said that the reports should have contained a statement of average results, which would have settled some of the leading features and principles of steam-cultivation. This objection very

robably takes some such form as this: "It is now ten or twelve ears since steam-cultivation was first introduced; there are hundreds f steam-engines at work on the land, and so extensive an inquiry as hat of last year ought to have settled some of the main questions ffecting steam-cultivation, such as the average cost of steam *versus* orses, or any other power; the kind of implements which we had est employ; and the best mode of applying the best power." While ot agreeing at all in these views, I think it right to mention them, ecause I believe that a complete answer can be given to any objections hat may be raised.

I think we are very apt to attribute too much importance to a tatement of average results. There is a feeling common amongst us, hat if the number of instances of which the average has been taken is ufficiently great, we arrive at something like a law of nature from which there is no appeal. When considering the value of averages we ought especially to consider the kind of results from which the average is collected, because if the results themselves are dissimilar, it is plain that the average loses its value altogether. Take any familiar example—chairs for instance. On comparing the cost of a certain number of chairs, of the same kind of material and manufacture, the average cost of a great number would furnish information as to their price; but on comparing chairs of all kinds, from the plain wooden kitchen chair to the highly-ornamented drawing-room chair, covered with satin-damask, the average struck would furnish no idea of the value to an intending purchaser. It would not be the average price of any particular kind of chair, and therefore, instead of being a guide, it would only lead him into error. If we apply this to the case in hand, we shall at once see that the cost of cultivating strong clay-land will always be greater than the cost of cultivating light-land farms. Therefore the average cost of cultivating the two different kinds of land would be of no value to the man who wished to obtain information as to the cultivation of one or the other.

In endeavouring to strike an average of the results of steam-cultivation in a certain number of cases where the soil is somewhat similar, you have to take into account the old adage, that "one man will thrive where another will starve;" and if you are to consider not only the differences of soil and climate, and the size and position of farms, but also what is the average of the capacities of the men who would have to conduct the operations, then I think you will perceive that if our reporters had attempted to deal with the question of averages at all, they would have been brought into great difficulties in their calculations, and would in the end have produced a result of no practical value. Consequently, I think they have exercised a wise discretion in discarding all averages, and merely tabulating the results of their inquiries, side by side, for the convenience of the reader in search of special and comparative information.

Then we come to the second point I mentioned, the kind of machinery to be adopted.

There are strong reasons why the name of any individual maker should, if possible, not be brought forward in a report of this kind;

and the only reason which would be sufficient to warrant the adoption of such a course would be the existence of so many makers, and so large a variety of apparatus, that it would be a positive benefit to an intending steam-cultivator, bewildered in his choice, to be guided by the experience of gentlemen who, like our reporters, have had the opportunity of seeing many implements, and judging of their various capabilities. In the early days of steam cultivation there were a great number of inventors and makers. During the last five or six years, however, many of these implements have been found unable to stand the test of every-day wear and tear; the consequence is, that a few implement-makers have gathered up the best of the inventions, and at the present time the number of those who stand as recognised manufacturers of steam-cultivators is so small, that if a purchaser cannot, after an exhibition of the implements at work, and a perusal of the descriptions furnished of their different merits and capabilities by those who have worked them, decide which maker he should go to, and which system he should adopt, he is, depend upon it, not in a position to begin to cultivate by steam, and had better postpone altogether the introduction of a steam-implement upon his farm.

The third question I have heard raised is as to the best mode of applying steam-power—the system of husbandry which best brings out the full power of steam upon certain farms.

It has been said that our reporters should have gone into those questions. Now, I do think that here, as in the other points, they have exercised a very sound discretion, and so far from feeling any disappointment myself that we have not made greater progress in settling a definite code of steam-cultivation, I think we shall, if we look fairly at it, feel very grateful that so much has been accomplished. Of the answers returned in reply to questions sent out by the Society, 178 came from owners and employers of steam apparatus; and out of those 178, only one had had his apparatus at work for more than ten years; and only 33 have been working a steam apparatus more than five years. Some, perhaps, may say that a man who has been at work so long ought to have been able to make some progress towards establishing a definite system of cultivation adapted for steam; but it must be borne in mind that even so short a time as eight or ten years ago the steam apparatus itself was by no means in the perfect state it is now. It required great and constant improvement; there were heavy expenses of wear and tear, and constant outlay for renewals. So I cannot see how those who have been at work five or six years only can be expected to have made much progress in fixing a definite code of steam-cultivation. We must remember, too, that all this time they have had to prepare their farms for the introduction of steam, to instruct their men in the use of machinery, and to inform themselves, in many cases, as to the best mode both of working and applying the new power. In fact, it amounts to this, that they had not only to adapt agriculture to steam, but to adapt steam to agriculture at the same time. If that be so, we are undoubtedly much indebted to those pioneers of progress who have thrown themselves heartily into this question, and have spared

neither time nor money in their determination to make the cultivation of land by steam a great and signal success.

Having dealt with the objections which I have heard stated, and which I hold have no foundation, I would next ask your opinion and invite discussion upon certain questions which I will very briefly indicate.

One question I put before you is: What in your opinion is the most useful and practical feature of these reports? I have been asked that question myself; an answer can never be better supplied than by such a meeting as this, and I have thought it would not be a bad way of treating this discussion to repeat to you some of the questions put to me by gentlemen interested in steam-cultivation.

As to the question, "Which is the most prominent practical feature of the reports?" I have no hesitation in saying that I should assign the chief prominence to the fact that the reports are a faithful record of numerous cases where steam has been applied to the cultivation of farms under a great variety of circumstances, such as soil, climate, position, and other special conditions. These descriptions of so many different farms, and the faithful accounts of steam operations in a large number of instances, will furnish reliable data to almost every one who, finding himself in a difficulty, may wish to profit by the experience of others; he will be almost sure to find in these reports some case similar in many respects to his own. If the water he is obliged to use be bad, he will find instances in which a few pennyworths of Frank's fluid have been found sufficient to destroy its injurious character, and save the boiler. If that in a wet season he should be in danger of losing his seed-time, he may read that others have got out of their difficulty by purchasing a steam-plough in addition to a steam-cultivator. Indeed, there is hardly any difficulty which can occur to a man using a steam apparatus which is not here described, and respecting which he will not find advice founded on experience to assist him out of it. Even in those few instances, where an inquirer fails to meet with the information he is in search of, the reports will tell him where he may apply for information to men who have probably gone through the same difficulties as himself.

Then, again, a man wishing to set up a steam apparatus would be able to find the experiences of those who, in somewhat similar conditions of soil and situation, have decided what kind of apparatus would be best suited for the particular system he meant to adopt—whether aiming at great results by a large outlay, or otherwise. There is, for example, the farm of Mr. Bomford, No. 69 in the report, which is rather an extraordinary instance of a man who is so taught by successful experience that he is not satisfied with having had two steam-engines and sets of working apparatus upon his farm, but intended, when the Commissioners visited him, to have two more. That I should consider a strong case of a man of large capital and energy going in for great results. If, on the other hand, a man wish to take the lowest mode, of employing a steam auxiliary, as it is very properly termed, and with a small outlay to get a powerful assistant

(but still only an assistant to the ordinary appliances of the farm), he has the experience of those who have gone before him in the same path, such experience being recorded and illustrated by most able pens, for his special guidance and instruction. These are my own opinions, but I should like to hear what, in the opinion of the meeting, are the most practical and useful features of the reports.

A second question, to which it might be useful to direct your attention, is,—"Does it appear from these reports that steam-cultivation is successful as a commercial speculation?"

As the solution of a mechanical problem, no doubt it is a most perfect and thorough success. That which was proposed has been accomplished, and great feats of cultivation have been performed by steam which no other power could possibly have undertaken with the same result. But then comes the question, whether as a commercial speculation steam-cultivation has generally been a success? Does it in the majority of cases lead to profit in a pecuniary point of view? I should be inclined to describe it as a success which a very small amount of ignorance and inattention would convert into a failure; a success where well managed, and a failure where badly managed. Between these two extremes there is to be met with almost every variety of great and modified success down to partial failure. A clever man will make steam-cultivation answer; but a man who does not understand the subject himself, or cannot obtain an efficient manager or assistant, must be very careful how he touches the matter at all. That is the impression left upon my mind by a very careful comparison and perusal of the reports. No doubt upon clay-land a depth and perfection of cultivation can be obtained which could not otherwise be accomplished. In fact strong clay, such as that described in one of our reports two or three years ago,* as a soil varying at different seasons of the year from glue to cast-iron, cannot be really and efficiently worked except by steam. But, unfortunately, that kind of soil is chiefly held in small occupations, and the problem how to apply steam successfully to them has not yet been solved.

The purchase of a powerful steam apparatus by the owner of 200 acres or so of clay-land, is, of course, out of the question, unless it be used on the adjoining farms as well. As yet, however, the partnership or company principle has not been sufficiently tried in agriculture for the results to be spoken of with any degree of confidence. This is one of the things upon which suggestions are desirable, and in which it would be most gratifying to see advancement made.

Again, with respect to light-lands, I believe we shall soon see steam-engines very generally employed as an auxiliary on a large farm for cleaning stubbles in the autumn, for breaking up land for barley in the spring, and for many similar purposes. A light cheap steam apparatus would be most valuable on such lands; indeed, I believe we shall soon see no farm of any considerable acreage without it. This is a matter, however, in which improvement is required; we

* Vide 'Journal,' vol. xxv., part ii., p. 521.

want suggestions for the use and management of an apparatus for light-lands, not too heavy nor requiring too much power, and purchaseable for a reasonable sum.

The three questions then which I should like to propound to the meeting are these:—1st. Which is the most practical and useful feature of the reports? 2nd. Does it appear from these reports, or from the general knowledge of those who may speak upon the subject, that steam-cultivation is successful generally as a commercial speculation? and, 3rd. In what direction does our present system of steam-cultivation most require improvement?

The Note-Book.

1. — *The North Shore of Cornwall.* By CUTHBI JOHNSON, F.R.S.

IN visiting the very interesting county of Cornwall, tl must be prepared for a system of cultivation differin from that of our eastern shores. Such a traveller must r its peculiar soils, its mountainous character, and its warmer in winter, and far more moist at all seasons th our eastern and southern counties. The south-westerly too, of the land, its narrow form, surrounded on three sid Atlantic, must also be taken into account.

If the tourist bears these facts in remembrance, h prepared to meet in Cornwall with a district in which tl more grass than cereal crops. From the very hilly nat county, the mountains and valleys in many places ha slopes far too rapid and broken to admit of the formati but small enclosures, he will also anticipate small fa these, as frequently is the case with small holdings, oft rented.

Amongst the farmers of Cornwall, however, both l small, there appears to be an air of comfort and inde Their cows, their bullocks, their white-faced sheep, th all appear in good condition, and, like their owners, quite to be on the most friendly terms with strangers. T majority of the farms are small, being of such an exte the labour required is performed by the tenant and hi There is certainly more than three-fourths of the acreag farms in grass, the remainder being cereals and root crops are taken after a two or three years' ley. Bean succeed in this district. Peas are little grown. The letting their farms does not appear to be conducive to go ing; but although long since denounced, it still contin practised.

When a quarter of a century since the late Mr. W. F. of Truro, was so well and energetically addressing hims obstacles which exist to the improvement of Cornish ag he had occasion to remark ('Jour. Roy. Agr. Soc.,' vol. v

that farms are generally let for terms of 7, 14, and 21 years. The rst is objectionable in every respect, and is a very great defect in ıe Cornish system of husbandry, which, combined as it was forıerly, and is now occasionally practised, with the system of letting states by '*tender*' to the highest bidder, forms the very acmé of ›lly. The effect of this system is to introduce a class of tenantry n estates without either skill or capital, such persons being lways ready to enter on a farm at an extravagant rental, and contriving to shuffle through their term' by *racking* the estates n every possible way."

The system, however, still continues; for while I am writing his a Plymouth newspaper is lying before me, containing a list f several farms "to be let by tender."

Two of the great formations of Cornwall are the slate, or grauvacke, and the granite, whose decomposed rocks form the surface oils. The soils of the grauwacke formation extend from the ıeighbourhood of Boscastle, down the north side of the county, o beyond St. Ives' Bay, one of the great stations of the pilchard ishermen, and then commences the granite formation of which he Land's End district is composed. On the granite the oils, as Mr. Karkeek observed, are exceedingly good, and he rent of the land, from the peculiar nature of the little armers, very high. These small cultivators are a hardvorking race of men, who keep many milch-cows, breed a large ıumber of pigs, and grow large quantities of potatoes. They ive chiefly, it seems, on barley-bread, fish, pork, and potatoes. The larger farmers keep numbers of the old black dairy-cows, which are supposed to be the aboriginal breed of the county. And by these the Dorsetshire system is often followed, that of etting the cows to dairy-men, who pay 8*l.* per annum to the ›wner for each cow. For this sum, however, they have a quarter ›f an acre of potato-ground, 2 loads of turnips, 9 cwt. of straw, 72 faggots of furze, 100 turf, and 1¼ acres of land for the keep of he cow. A renter of five cows has a dwelling-house, pig-houses, ınd potato-houses provided in addition. The calves belong to he dairy-man.

But as Mr. Karkeek remarked, when speaking of the grauvacke group of soils, in his able and fearless paper on the farming ›f Cornwall (ibid., vol. vi., p. 408). "The country lying on the ıate rocks is widely contrasted with that on the granite. The ıills are smooth, as if by art, and are so irregularly disposed that hey have not unaptly been compared to the waves of the sea, rom their undulating character. Under the term 'slate' we include all kinds of rocks, commonly so called, that are composed ›f sedimentary deposits, varying from the roofing slate even to a oose brown rubble, or becoming hardened, and so forming pud-

ding-stones of great size. The colours are various—light grey, bluish grey, brown, whitish yellow, red, and variegated, the red and variegated being generally considered the most productive. Within these argillaceous masses are discovered products of fire in various places. In districts adjoining the granite, felspar porphyritic rocks (provincially termed *Elvans*) traverse the slates in the form of dykes, varying from a few to 400 feet in breadth. The land where these elvans prevail is frequently covered by a thin layer of quartz fragments (provincially called spar), which abundantly traverse the slates in these districts. In other parts of the area we have igneous products which may properly be termed sedimentary, since 'they appear to have been deposited in beds among the slates during their formation by the agency of water, after being ejected from fissures or craters in the shape of ashes or cinders, precisely as we might expect would happen at the present day with ashes or cinders discharged from volcanoes into the sea.' These accumulations are termed 'sedimentary ash' (provincially 'dun stone,' or, when blistery, 'honeycomb dun') Their presence among the slates is a certain evidence of the fertility of the soil. In districts where these abound are discovered beds of greenstone and other solid trappean rocks, 'which seem to have formed sheets or streams of melted rock, amid the mud, silt, sand, or gravel then in the course of accumulation, and which now constitute associated beds of slate, sandstone, and conglomerates.' Wherever these products of fire are discovered, the soil proves exceedingly productive. Again, in other portions of the slates we have accumulations of calcareous matters, and although never in sufficient breadth to give a character to the soil, yet they also are certain evidences of fertility. It is also observed that the character of the soil on the slates is affected by their inclination or dip. Where the underlie is considerable and the subsoil shallow, the surface-soil is light and hungry, the soluble manures passing rapidly through the slaty fissures; and even where the slates lie horizontally, and are of an indurated character, with the soil of little depth, such land will scorch or burn readily in the summer. We have a great deal of cliff-land of this description."

But upon either the granite or the grauwacke formations, as I have before remarked, in even the very smallest farm-houses of Cornwall (and the same remark applies in general to the cottage of the labourer) there are marks of comfort and self-independence. It is rarely that a beggar is seen, or any evidences of poverty, even in this trying time for Cornwall. Their mines, their fisheries and their agriculture usually find them ample employment. Their fisheries are chiefly confined to the more westerly and southerly portions of the county. About Tintagel and Boscastle I have

only lobster-fishing. On this coast, however, in the deep
s of its cliffs, numbers of seals are occasionally secured;
e repay the fishermen by their skins, and by their oil, a seal
monly yielding about three or four gallons. This year, how-
, the seals have been unusually scarce.

was early in September of the present year (1867) that I located
elf at the little port of Boscastle, one of those picturesque
e Cornish coves that the wild waves of the Western Ocean
e worn out of the grauwacke cliffs, at the mouth of a little
ntain-stream. Here the inhabitants have formed, by means
very small breakwater, a snug little harbour where two or
e little coasters can lie secure in all storms. They thus
age to carry on a considerable wholesale trade in coals,
es, and other heavy articles of merchandise. Here, too, the
iculturist will remark with some interest bevies of farmers'
s busily employed in carrying away the sea-weeds and the
sand, which are employed to an enormous extent in this
nty as manures. The reader must be reminded that the
uwacke, which so very extensively forms the soils of this
nty, is almost entirely devoid of carbonate of lime. Now,
best sea-sand, which has been for ages employed by the
nish cultivators, is very largely composed of finely-divided
lls, and these are chiefly formed of carbonate of lime, with a
y small portion of phosphate of lime. This sand, therefore,
s to the soils of the grauwacke the very salts of lime of which
y are deficient. Grauwacke is composed of pieces of quartz,
ty slate, felspar, and clay-slate cemented together with a basis
lay-slate; 100 parts of clay-slate contain:—

Silica	48·6
Alumina	23·5
Magnesia	1·6
Per-oxide of iron	11·3
Potash	5·2
Carbon and sulphur	0·4
Water	7·6
Loss	1·8

But there is something else in these sands that fertilises the
, for they are often harsh-looking sands, evidently devoid of
areous matter, and would seem unlikely to become available
food for plants. The farmers, too, prefer the sand, which,
ng daily covered by the tide, is quite saturated with sea-water.
ey will send to a considerable distance for this salt-water sand,
ough they might get the same sand, above the influence of
sea, with far less labour. The carting of these sands is
eed a much more laborious operation than our neighbours in
land districts would believe. While I am writing this, a

string of sand-loaded carts are passing up a steep road before my windows. This incline is certainly near a mile in length; it has been well and skilfully made by the Boscastleites, but it needs three horses to drag about a cubic yard-and-a-half of sea-sand up the hill. So highly valued is this sand that it is frequently drawn from the sea-shore up apparently impossible inclines, and over such rough roads that none but the active little Cornish cart-horses could surmount; and in places where the cliffs are so steep that only pathways exist, they carry the sand from the shore to the top of the cliffs in bags on the backs of donkeys, from whence it is carted on to the land.

About from 5 to 10 loads of sand per acre are mixed with heaps of turf gathered from under the hedges, collections of weeds, and some farmyard-manure, and this forms a good dressing for the soil. The sand, it appears, is more valued in the interior of the county than by the farmers in the immediate vicinity of the sea-shore.

The long-continued use of this sea-sand was sometime since described by Sir Henry De la Beche ('Jour. Roy. Agr. Soc. vol. iii. p. 21) in a report which I need not attempt to do more than abridge. "The sands thus employed," he observes, "are partly thrown up by the sea, and partly an accumulation at various points when the relative levels of sea and land were different from those we now find—the land having been apparently raised. Sand was employed as now for agricultural purposes 265 years since, as appears by 'Carew's Survey of Cornwall' (A.D. 1602). In 1811 Mr. Worgan ('View of the Agriculture of Cornwall,' p. 128) estimated the expense incurred for the whole county in land-carriage for this sand at upwards of 30,000*l.* per annum. The late Dr. Paris informs us ('Trans. Geo. Soc. of Cornwall, vol. i. p. 193) that 4000 horse-loads of it have been taken from Bude Haven in one day. Not only is it carried from that place by the Bude and Launceston Canal with its branch extending to Holsworthy (the chief commerce of which is the conveyance of this sand), but it is conveyed overland abundantly in carts; so that a considerable extent of the adjoining portions of Cornwall and Devon are supplied with it from Bude. A good road has been also constructed on the coast near Camelford, purposely for conveying the sea-sand into the interior."

Large quantities of sand are obtained from the Dunbar in Padstow Harbour, employing constantly about 80 men in several barges. The amount of sand taken from this harbour was long since estimated at about 100,000 tons per annum—a large proportion of which is conveyed into the interior from Wade Bridge by the Bodmin Railway and its branch up the Camel Valley to Wineford.

Sand, indeed, for agricultural purposes is obtained in numerous bays and creeks on the north coast of Cornwall, from Trevose Head to the Land's End, and is valued in proportion to the shelly matter it contains. Of the few places whence sand is carried on the south of Cornwall, that from Falmouth Harbour, composed of little else than corals, shells, and their fragments, is mostly esteemed. "If," adds Sir Henry De la Beche, "we consider that Padstow Harbour furnishes one-fourth of the sand employed in Cornwall and Devon for agricultural purposes, and estimate the ton to contain about 14 cubic feet, we should have 5,600,000 cubic feet of sand, chiefly composed of comminuted sea-shells, annually conveyed from the coast and spread over the land in the interior as mineral manure. If we take the produce of Padstow Harbour as only a fifth, then we should have 7,000,000 cubic feet thus distributed."

As may be conceived, numerous local causes tend to diminish or increase the value of the sand along the coast; generally speaking, the harder the coast and the less the detritus that can be worn from it, the greater the proportion of the comminuted shells in a given portion of sand. The easier also the streams flowing towards the shelly sands can deposit the sandy detritus they bring down in floods before they reach the shelly banks, the finer the sand. We have found the sands considered worth removal for agricultural purposes to vary from 40 to 70 per cent. in their calcareous contents. Dr. Paris found in the sands usually employed from 60 to 64 per cent. of carbonate of lime. This may probably be taken as a fair average proportion. As I have remarked, Dr. Paris also suggested that, though unquestionably the beneficial effects of this mineral manure depend on the presence of calcareous matter, yet the sea-salt with which it is impregnated contributes materially to its fertilising powers; citing, as a fact bearing strongly in favour of this opinion, that the farmers send several miles to the harbour of Padstow for the sand, which is drifted, void of sea-water, close to their lands; and, as Borlase remarks ('Nat. Hist. Cornwall,' p. 83), "Blown sand which has been long exposed to the air is good for little, its salts are so wasted by wind and rain." The farmers certainly appear to prefer the sand which the tide has just left, and which must therefore contain much saline matter. It then often contains fragments of seaweed, and occasionally fresh animal matter derived from dead marine creatures, amongst which are the tenants of microscopic shells still little decomposed."

But after every allowance is made for the fertilising properties of the calcareous, organic, and saline matters found in the sea-sand, I am inclined to believe that there is yet some, either mechanical or chemical action in these sands, with which at

present we are not acquainted. The sand which the Cornish farmers collect from the beach is, as I have already remarked, in some instances devoid of calcareous matter; for instance, the sand largely carried from the beach at Crackington Cove is a clean mixture of fine fragments of quartz and slate, and yet this sand is carried in bags up the long, steep path, leading from this beautiful and romantic inlet, on the backs of donkeys, at an expense of nearly 3*d.* per donkey-load. The value of certain varieties of sand, as manures, indeed, well needs a closer examination than it has hitherto received; the use of the silver-sand by the gardener for mixing with the soil in which he strikes his plants, and the good effects produced on grass-lands in Surrey by dressing them with the sand collected from our flint-repaired roads, appear to indicate that we are not yet fully aware of the mode in which these sands operate so advantageously.—*Mark Lane Express.*

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2. *An American's View of the Principles of Stock Breeding.* By Dr. J. R. Breckinridge.

The particular stock to which the following remarks more immediately relate are the Shorthorns, commonly called Durham cattle. But the great principles laid down apply to all kinds of domestic quadrupeds.

There are two natural laws which lie at the foundation of this whole subject, both of which we must steadily regard. The first is that like produces like. What we expect and desire in offspring we must find in the parents. This stability and uniformity of nature is the very foundation of the whole order of the universe. We are not entitled to expect that it will be departed from for our advantage, nor need we have any fear that we may not trust implicitly to its force. What we mean by pure-blood or high-bred is that the animals thus designated belong to a family that carries very far, and that has carried very long, the power to produce other animals having the particular qualities we prize and seek. This great law of like after like is subject, like every other law of nature, to be weakened, or to be increased in its power, and is liable to operate to the great injury or the great advantage of man. But its existence and its fundamental importance must be recognized in every step the breeder takes.

The second of the two great natural laws alluded to above may be thus stated: Culture is capable of modifying the great law of like after like, both for good and for evil, to the utmost extent compatible with the enduring power of the law itself. It is impossible to limit to the injury or to the improvement

that everything which exists is capable of, while yet remaining essentially the same. While the first law teaches us that we can improve everything that exists, these two laws give to the breeder all the control that is possible or desirable over the subject. Absolute unity, certainty, and steadfastness in the thing, and yet almost boundless variety in the modes of its manifestation—these are the two grand truths which the breeder must operate with, in all his endeavours to perpetuate or to improve any race of animals.

1. In the first place it is utterly impossible for us to perpetuate *artificial* pecularities of any kind whatever. A horse, nicked or foxed, never begets a nicked or foxed colt.

2. In the second place, *natural* peculiarities—congenital as they are called—when they are uniform in the particular race, will be propagated with like uniformity.

3. In the third place, these natural peculiarities, even when they are personal to the particular animal, are to a certain extent, propagated in its offspring; thus, a bull born without a tail, or with a very coarse head, may be expected to have some calves with similar defects, and following up, we might at last establish a family thus accidentally originated by nature.

4. In the fourth place, we may, by persevering neglect, or ignorance, or design, greatly seduce nature to originate these accidental varieties, and torture her into the production of deformed, or barren, or monstrous animals.

5. In the fifth place, we may, by docile, assiduous, and kind waiting on nature, so learn her ways, and so win her smile, that our wise and experienced endeavours to help her efforts will be followed by abundant rewards in the increased beauty, excellence, and value of all we rear.

6. In the sixth place, our wisdom is, therefore, to avoid carefully all those pecularities which are merely *personal* to particular animals, and to select animals for their general perfection in the peculiarities common to the race; for in the former case, we are liable to an excessive special development, while in the latter case we may expect general excellence and improvement, which are what we want.

A vast amount of injury is done to domestic animals of all sorts by crossing various races of each kind upon one another. No man can guess of what race, or of what mixture of race, the common cattle, horses, sheep, or hogs of the country originally came; but every man can see how few capital animals are to be found among any of them. This promiscuous method of breeding one variety upon another subverts the first law, and resists the uniform endeavour of nature, as applied to the whole subject of breeding. We cannot even keep up a race of half-breds by

breeding half-breds to each other. How, then, can a race, with a multitude of different crosses in it, possibly be either uniform or valuable? To adhere tenaciously to an unmixed blood is the very first requisite in all breeding that aims to preserve the excellence we have already secured, or to increase it in any race of animals.

The question of pure blood, as applied to every race of animals, has already been explained as a matter of principle. As a matter of fact, in the case of each particular animal, while we are left, in a great degree, to depend on the testimony of owners and traders for extended pedigree, yet there are natural marks well known to experienced breeders, and clearly laid down in all books which treat of the different races of animals, which render gross imposition impossible on those who understand their business. A thorough-bred Shorthorn is as easily distinguished from other races of cattle as a Saxon sheep is from a Cotswold, or a race-horse from a cart-horse; and unless we will put ourselves to the trouble of being qualified to do this, we must be content to trust our ignorance to chance. With regard to herd-books, we are liable to form very erroneous opinions. Those books are of great value, precisely as any other means of advertising is, and also very much as a record office of land titles is. But it is very idle to suppose that all advertisements are strictly true, or that all lands with a perfect title are rich lands. Many herd-book pedigrees are, on their face, condemnatory of the animals advertised, and not a few are incorrect. That breeders do not guard against such evils, or that they are not sufficiently informed to do so, are amongst the reasons why they are so often disappointed in the stock they breed.

It is one evil result of the various errors already alluded to, that any countenance should be given to attempts to elevate high grade cattle to something like an equality with those of pure blood. High grades are, no doubt, a very great improvement on the common cattle; but to dignify with the name of full-blooded, and to allow them to be considered as a near approach to the pure-blooded, is a serious error, which can work nothing but injury to the stock of the country, and which can impose on none but ignorant breeders. If the Shorthorns were a race made by crossing several races, which some have ignorantly pretended, even then it would be useless for us to work the race over again by new crosses. But being it is a distinct, peculiar, and very perfect race, created, perhaps, at first, and very anciently, by natural congenital peculiarities in certain animals, and afterwards most carefully bred and improved by culture through many centuries, and now widely diffused and multiplied in all the finest portions of the earth, it

is mere wantonness for those who are interested in this noble race to connive at practices so injurious to its reputation and value. If full-blooded means anything else than thorough-bred, then it means grade, and ought to be so called; but if it means to place the grade on a level with the pure, then it is mere folly or imposture.

Thus separating the pure from the grade, produced by itself and from all mixture of other races, no matter how excellent, we are restricted in breeding to animals of the one race, and this universally in all breeding that aims at permanent improvement. Pure breeding is, therefore, necessarily in-and-in breeding, to a certain extent. How far that principle should go, and by what means we can best avoid its supposed evil results,. are questions upon which great difference of opinion exists. In this country there is a general prejudice against in-and-in breeding, and breeders of shorthorns generally have accustomed themselves to keep their bulls only for a few years, and to seek breeding animals as remotely related to their own herds as they could obtain. It is this same feeling which has created and sustained such constant and excessive importations of shorthorns from England; although, in the judgment of those most qualified to judge, and who have had the best opportunities of forming an opinion, we have in Kentucky larger herds and better animals than exist in England.

As a matter of fact, experience has clearly proved, that while in-and-in breeding, followed ignorantly or indefinitely, may produce much injury, at the same time in-and-in breeding has been so followed as to produce not only the very finest animals, but the very finest herds of the race. As a matter of principle, as has been already intimated, in-and-in breeding is but another name for pure breeding. For all pure breeding is confining ourselves to one race; while in-and-breeding is but confining ourselves to a few, or to a single family of that race. If we will be guided by Nature, her proceedings are invariable as to the method by which she keeps races distinct, and carries them to perfection. For all animals that pair, pair out of the same litter from generation to generation; and amongst all gregarious animals, not only does the same herd continue itself, but it happens necessarily and continually, that the very closest in-and-in breeding, both up and down, and collateral, is the very rule of her work. In both instatces, the results she produces are a uniformity and a perfection in every species, up to the highest points permitted by the circumstances of each. The general truth undoubtedly is, by skilful in-and-in breeding we intensify the prevailing blood, whatever that is; we get rid of all subordinate

mixtures and tendencies; we give increased stability and uniformity to the peculiar characteristics of the race; and we establish, in the firmest manner possible, all the qualities of the race, whatever they may be. It cannot be too distintly understood that this question depends essentially upon another already spoken of. If the shorthorns be a distinct and pure a race, in-and-in breeding is a certain way to perfect it; but if it be a made race, in-and-in breeding is a certain way to break up as mixtures, and to bring out the prevailing races which compose it. As there can be no doubt that it is a pure race, the popular prejudice against in-and-in breeding, as applied to it, is unfounded and injurious.

There is some difierence of opinion as to the age at which animals should be put to breeding. The prevailing opinion among the best breeders is, that heifers should bring their first calf at about three years of age—some respect being had to the season of year at which the calf should come; and that bulls may be allowed to serve a few cows without injury to them at 15 or 18 months old. The average time of gestation for a cow is 218 days. Nearly all heifers will bring their first calf at 2 years of age, or even younger, if permitted, the effect of which is apt to be to retard the complete development of the cow, if not to injure her permanently in size and appearance. Under all circumstances, this race of cattle appears to be liable to occasional barrenness in both sexes; and to compensate for it by occasional excessive fecundity, twins being far more common than barren animals—both of which facts, if not peculiar to this race, are far more common than in any other. There is no reason to believe that the offspring, either of the cow or the bull, depends upon the age of either parent for its excellence, except so far as health of the parent, and its adequate vigour, may be considered as influenced by its time of life. As a race, the shorthorns are vigorous, healthful, and long-lived. Among them, as amongst all creatures that exist, there is reason to believe that hereditary qualities, that are personal, descend most surely across the sexes—to wit, from the male parent to the female issue, and *vice versâ;* a remarkable fact, of the very highest importance, of which all ages and conditions of men have had a vague conviction, which nothing but experience can establish, and which well deserves a more serious examination than it has received. *American World*

3.—*The Breeding and Management of Pigs.*

Too little attention is generally paid by farmers to their pigs; they are left pretty much to take care of themselves, and are often kept solely for the purpose of consuming refuse which would otherwise be wasted. The cost of increasing a stock of pigs is very trifling, as they multiply rapidly, and may, with good management, be maintained cheaply in store condition. It is, however, on dairy farms where the greatest number may be profitably kept, more particularly on those that have a considerable proportion of arable land. During the cheese-making months the whey will provide food, and when that runs short stubbing comes in to help, and after stubbing the root-harvest.

On a dairy farm, with no plough-land, the farmer will be obliged to buy food for his pigs during the winter months.

There are three ways of disposing of pigs: they may either be sold as stores, when weaned or later, or they may be fed and sold either as porkers or bacon pigs. In choosing between these several plans the farmer will be influenced by the locality he lives in and the distance from good markets.

A very good sale may be obtained for stores in the neighbourhood of large towns, or in mining districts; but, even under the most advantageous circumstances, it will sometimes be found impossible to sell all the stores to advantage, and then recourse must be had to feeding them. I believe it will prove most profitable to combine two of the above plans.

When the farmer has determined upon the method he intends to adopt in the disposal of his pigs, he will next have to fix upon the kind best suited to his purpose. Care should be taken not to run counter to the prejudices of a district, and of would-be purchasers. In some counties a very strong prejudice exists against black pigs, whilst in others they are preferred.

It is not my intention to enter into a discussion of the relative merits of the different kinds. Suffice it to say that the small and large whites, the Berkshires, the Essex, and the Suffolk pigs, are the most important. When it is intended to sell pigs as stores at an early age, the large white breed will be found to answer the best: these grow very rapidly, and are ready for sale at a much earlier age than their smaller brethren. For pork-feeding I should recommend either the small white Essex, or Suffolk, as these kinds get fat very readily, and, when put upon good food at an early age, do not grow, as a large pig would, instead of laying on flesh. The black Berkshire is perhaps the hardiest, and the Essex pig the most delicate. For bacon and general purposes no pig can be more desirable than the Berkshire, and

between them and a medium-sized white pig will the choice rest.

Neither very fat bacon nor pork sells well, and therefore, as hair denotes lean flesh, attention must be paid to this point. It should be long and silky, and there should be plenty of it.

I now come to treat of breeding pigs. The period of gestation in the pig is sixteen weeks; some old sows will go rather longer, but this may be taken as the rule. If young sows be well done, they will be fit to take the boar when eight months old, and will thus bring their first litter at a year old. If allowed to run much longer, especially if highly fed, a difficulty is experienced in getting them to breed. The time of putting all sows to the boar should depend somewhat upon the season; thus it will be a wiser policy to run the risk of a young sow turning than to allow her to bring her first litter during the coldest time of the year. It will not answer to keep sows four or five years to breed from, except in particular cases.

Boars should be kept by themselves in as quiet a place as possible, and always treated gently, or they are apt to become savage. Savage boars are awkward customers, and great difficulty is often experinced in getting sows away from them. Neither boars nor sows should be fed too highly; they will never be so successful as breeders if they are. Good store condition should be aimed at, and what that is every pig-keeper either knows or ought to know.

Before farrowing the sows should be fed better than they have been, in order to stimulate the secretion of milk; indeed, during the whole sixteen weeks they should, if possible, be kept gradually improving in condition. They should have exercise; this they will take themselves if they have plenty of range.

Poor sows will often produce the most healthy, and sometimes the largest pigs; but in nine cases out of ten the milk supply runs short, and then many deaths may be expected. Fat sows are equally objectionable; their pigs are generally weakly, and they are certain to destroy some by lying on them. At the time of farrowing the sow must be separated from her companions and placed in a proper house for the purpose, fitted up with a rail round to prevent her from crushing her young ones against the walls.

A small quantity of cut straw chaff should only be allowed as bedding: long straw is particularly objectionable for this purpose, as the little pigs become entangled in it before they are strong, and then the sow, if she moves about much, is almost certain to kill some by treading or lying on them. Some people recommend the removal [illegible] little pigs as they are born, and [illegible] lamps placed [illegible] the house to hold them

ıntil the sow has done farrowing, when they are all returned to ıer. This plan is, however, only to be recommended in the case ɔf very fat sows, when they are a long time in farrowing. As a ıule, the less the attendant interferes the better. I would not, however, have all sows left to themselves; in cases of mal-pre-ıentation, a little help may be judiciously given. For a few days ıfter pigging the sow should not have forcing food; if she appears ɔ be quite right at the end of that time she can then be treated well. Nothing will produce more milk than a little skim-milk given warm. A great deal of the after success of the pigs depends ıpon how they are treated at this stage.

At about a fortnight old the little pigs should begin to eat on heir own account, and a small trough, hurdled off so that the nother cannot get at it, must be provided for their use. Skim-nilk with a small quantity of flour in it will be most readily taken o, and they will soon begin to feed freely. In the case of pigs vhich are to be forced for exhibition, they may be induced to lrink a little milk when a few days old; after tumbling into the rough a few times they will soon learn to drink. In the case of ɔrdinary rearing, however, it will hardly pay to feed them so young. It must be remembered that more than half the breed ɔf a pig goes in at its mouth. On no account should young pigs ɔe allowed to depend entirely upon their mother's milk until weaning time. If they have been freely fed—and it will pay to feed all young animals well—they will not go back when weaned, ı great desideratum, as every one must know how long it takes for any animal to overcome the effects of being pinched when young. I would urge upon all pig-breeders very strongly the ıdvantage of having their pigs castrated before being weaned, care being taken that they have nothing given them for two meals ɔeforehand. There will be fewer losses by adopting this plan than by allowing them to get to a greater age.

Pigs may be weaned from seven to ten weeks old: this will lepend upon the season and their general condition. The better they have been done, the sooner may they be weaned; and for some time after they should be fed liberally.

No reason has yet been assigned why in some cases little pigs ose their tails, and in others do not. The blame cannot be laid ɔn the weather, as they fall off at all seasons; indeed, it is still a complete mystery to pig-breeders.

No animal will take so kindly to the young of another as a sow, and in some instances it will be found very convenient to give one sow the whole two litters to bring up. The only danger ncurred is, that the sow from whom the pigs are taken may uffer from her milk; but with care and proper attention no bad

results need follow. Even young gilts will take to the young of another.

Some attention must be paid to the time at which the sows are to farrow. If allowed to farrow too late in the autumn, the pigs will not thrive so well during the ensuing cold weather as they would do if older. Pigs suffer very much from cold. When possible, no sows should farrow later than the middle of October; they will then bring another litter in April. The best months are September and March, and the pig-breeder should try and arrange so as to have his general stock born during those months. The September pigs will be of good size and strong before the winter sets in, and will be able to stand the cold; and the March ones will be born at a time when there is no reasonable prospect of their growth being retarded by inclement weather; besides which, on a dairy farm, they will be just old enough to commence their ravages on the whey-cistern by the time the supply becomes plentiful. On most farms it will be found very troublesome to provide warm shelter for sows and pigs during very cold weather, and for this reason alone winter pigs should be avoided if possible.

All store pigs should have range, either in large yards or in grass fields. Sows will do well in a grass field with a shed attached, and will require no food whatever except grass for many months in the year. A little corn or a few roots can be given them when the grass runs short. The great objection to allowing pigs the range of a grass field is that, unless very carefully rung, they root up the turf; and some pigs (more especially old sows) have a supreme contempt for all fences, and are difficult to keep in any field, unless it be very strongly and closely enclosed.

As I said before, pigs are kept sometimes merely as general scavengers, to consume all the refuse food which would otherwise be wasted, and not for the immediate profit that they bring. This is a mistake, as, with careful management, pigs may be made to pay very well. They make very valuable manure—a point that ought not to be lost sight of.

Store pigs can be kept very cheaply, and will do well on food that no other animal kept by the farmer will eat. I have kept sows and stores in good condition on the bulbs of turnips picked up after fattening tegs, and they will thrive on turnip-tops, which sheep will not touch. I must not be supposed by any means to advocate a starving system; nothing can pay worse than to feed any animal badly. I am only attempting to show how cheaply store pigs may be kept. Fat sows will not be found profitable, neither will very poor ones; a happy medium should be aimed at.

I would strongly advocate the use of cooked food for all pigs; and, in case the farmer have not accommodation for cooking, that all meal be thoroughly soaked before being given. For this purpose the food should be mixed one day before another. When roots are plentiful, they will prove capital food for fattening pigs, mixed with meal, and boiled together to a pulp. The use of roots should not be continued to the end of the feeding time, or the meat will not be as firm as it should be.

Before entering upon the subject of the feeding of pigs upon whey, I would say that I do not hold with the plan of giving it alone to any kind of pig. It is apt to produce scour, the good properties of the whey being counteracted by its laxative tendency. Any one in the habit of seeing pigs fed solely on whey, and the places they live in, must have been struck by the waste. Some kind of meal should be placed in the whey cistern, and the more astringent this meal is in its properties the better. The meal will sink to the bottom and become thoroughly soaked, and the feeder will be enabled to ladle as much up as he requires to mix with the whey. I have used for many years Messrs. A. M. Smith and Co.'s palm-nut meal for this purpose, and have found it to answer admirably. It is astringent in its properties and very feeding at the price. With the addition of a little meal, it is wonderful how much better the pigs will thrive. I am convinced that it is one of the most profitable ways in which a farmer can use artificial food. When it is his intention to make his pigs into pork, it will be doubly useful, as they should never be allowed to get low in condition.

The number of store pigs that may be kept upon the whey from a given number of cows will depend upon the kind of cheese made, the nature of the land, and whether or no it be skimmed for whey butter before being given. Where cheese is carelessly made the whey will be found the most valuable as pig food, and *vice versâ*. On my own farm I have been enabled to keep from 80 to 100 store pigs on the whey of 40 cows, supplemented with 2 cwt. of palm-nut meal per week. I may say that I make Cheddar cheese and also a quantity of whey butter. In case the farmer determines upon selling his pigs out as stores, his course is very simple; he has nothing to do but keep them in good growing condition, and sell them when the supply of food runs short. When it is his intention to feed for bacon, he will do wisely to keep his autumn farrows (in case he breeds the pigs he feeds) well during the winter and spring months, and they will be fit for the knife in September or October. The same will hold good in case the pigs are brought in. The spring farrows will also require good food, and will be ready to kill later in the season. Thus the earliest pigs will be killed when twelve or

thirteen months old, and the spring ones from eight to eleven. Bacon is now cured at all seasons of the year in large towns, and is often cut up and sold within a month after.

About one bacon pig to a cow may be kept, and the whey supplemented by whatever kind of meal can be bought the cheapest. Nut-meal is the most valuable feeding stuff that can be used, then Indian corn-meal, and lastly, barley-meal. When home-grown barley is only 3*s.* a quarter dearer than foreign, it will answer better. In the case of a mixed arable and grass farm, the tail and damaged corn will be used for this purpose.

When possible, especially on mixed husbandry farms, it will be found more profitable to breed the pigs than to buy them; the farmer by this means will secure both profits, that of rearing and also that of feeding. The want of proper accommodation will often be fatal to the carrying out of this plan, as without it no one must attempt to keep a number of breeding sows.

And now I come to the subject of porkers. When within reasonable distance, say 100 miles of London, it will be found the wisest policy to kill the porkers at home, and send them there to be sold. It is not always possible to sell a large number at home, and a better price will always be secured if the pigs are not made too fat or large. From 60 lb. to 70 lb., perhaps, will be found the most selling weight, and perhaps on the whole the most profitable.

The pigs should be packed in hampers with no cloths, and not backsetted. The most convenient-sized hampers are those which will hold four pigs packed on their backs, the two upper ones being placed between the legs of those under them. If the farmer have, or can rig up, a slaughter-house on his own premises, I would advise him by all means to kill the pigs at home. A butcher will always be found to do this for 6*d.* a piece; the insides are worth from 1*s.* 6*d.* to 2*s.* each, and a ready sale will be had for them among the labourers on the farm.

Pigs intended for pork should be fed well from the time they leave the sow, and they ought, if moderately well done, to be fit for the knife when from four to five months old. Large pork will be found to sell better in the country than in London.

I would warn any one desirous of driving a flourishing pork trade from using any condiment, such as fenugreek and aniseed, with the meal he feeds his pigs upon. These things will taint the meat and give it a most peculiar taste.

In conclusion, I would recommend a plan I have adopted with much success, viz., that of giving the pig-feeder, as part of his wages, a certain sum for every pig he rears to weaning time. This will be found [illegible] only to render him extra careful of the [illegible] when [illegible] it also [illegible] make it his interest, as well as

his master's, to keep his sows in a fit state to breed large litters. The best servants are apt to overfeed their favourites, but they will soon give the practice up when they perceive that it is not to their advantage to do so.—*T. H. A., in the 'Field.'*

4.—*The Mare for Stud Purposes.* By Mr. Clancy, V.S.

Certainties in horse-breeding are fallacious, yet we must be guided by general rules; and the breeder who carefully studies the selection of his mare and stallion will far outstrip the reckless beeeder—one who breeds from a mare he considers useless for any other purpose, or from a stallion because he belongs to a friend, or that he passes his house, or that he can be got for a trifle. Breeding under such circumstances is a bad practice, and one which has deterred many men from breeding, simply because the animal they bred was worth nothing in the market. They went on chance and negligence, which was certain to disappoint them, and the consequence was they gave up breeding.

Before entering into detail, I would impress on you the superiority of the mare over the stallion in producing a good horse of any class. The higher we go in the scale of nature the more acute become the rules which govern her. The thorough-bred horse is the highest standard of the equine race, and I shall recount facts in the breeding of thorough-breds to prove that the mare requires more attention in her selection than that of the stallion.

The Stud Book records the breeding of all the blood horses in England and Ireland, very accurately kept. If you refer to it you will find that the dams of the best horses of each year had produced good horses in every year, and in the majority of cases by different stallions, of different strains of blood. With fashionable stallions the average number of mares put to them is about forty; out of the produce of these forty mares they may get from ten to twenty good horses, and in many cases not even that number. The mare gets but one stallion put to her; consequently the stallion gets forty chances to the mare's one, and yet that one is a success.

The breeding of horses may be divided into five classes—thorough-breds, hunters, hacks, carriage-horses, and horses used for agricultural or commercial purposes. As I have before stated, to the careful selection of the dam I particularly direct your attention; yet, while I advocate the selection of the dam, do not let me be understood as throwing overboard the due consideration of a stallion's qualities: our great object should be to produce an animal as near perfection as possible. For this end the stallion

chosen should be possessed of those qualities in which the dam may be deficient; that by combination we may expect to have produced an animal whose value will compensate us for the expense, anxiety, and trouble attendant on breeding.

In the selection of either sire or dam, the following particulars should be carefully inquired into: True blood, soundness, shape, action, age, height, and temper.

As I do not wish to particularise any class of horse, the remarks I offer are applicable to all classes. Of course, each class has its peculiarities. For instance, a thorough-bred shoulder is a bad one to put a collar on; and thorough-bred action would not answer in a four-horse plough. General rules I can only give you, and you can apply them to all classes of horse.

It is not my intention to enter into the due observance of the crossing of the particular strains of blood to produce a first-class racer, nor shall I dwell on the breeding of thorough-bred stock; the horses bred by us are of a lower class, and to those I will draw your attention.

The pedigree of the hunter does not require that nicety of selection as in blood-stock; still I would advise you to select your mare with a couple of crosses of the thorough-bred. Our hunters are oftentimes called upon to perform extraordinary acts of gameness, and from the thorough-bred blood comes all their pluck and courage to stay a distance, and, by their blood-like action, to give to their riders a comfortable seat in the saddle.

In the breeding of hacks and carriage-horses pedigree is not of very great importance; and yet, without a dash of thorough-bred in their veins, you cannot produce a horse to ride or step well. Cart-horses should be descended from parents true in blood in their own class.

The all-important point of soundness is next to be considered. It is the essential point in the brood mare for all purposes; for it is a notorious fact that there are diseases to which the parents are subject, which will descend to their progeny. To guard against propagating those diseases we should, therefore, be particular in our examination of mares required for the stud.

In the majority of cases a mare is never put to the stud until she is considered fit for nothing else. This is an absurd notion, and one I would caution you against. When you believe a mare "fit for nothing else," consign her to the knacker or hounds, rather than encumber yourself with her useless progeny; for such they will prove to be.

Men of shrewd observation have asserted that the outward shape or make of a horse is more derived from the sire than the dam, and his internal qualities, as gameness, courage, action, and endurance, are especially taken from the dam. My own observation

would lead me to a like conclusion; therefore I would impress upon you the prudence of particularly examining the stallion, and have him as sound as possible. I would advise you to make certain that both stallion and mare are in a perfectly healthy state; either in a diseased or sickly state will materially retard impregnation, and interfere with the healthy development of the foal.

Our next consideration is shape. A good form seldom covers a bad horse, yet very good animals are notoriously ugly creatures. It must, however, be taken into consideration that certain points which appear to interfere with the symmetry of the animal may, by their excellence, be considered beautiful by the judge of horseflesh.

When judging of external conformation, the breed, age, and condition of the animal have to be fairly considered. The horse of sixteen summers and the mare of three years old do not exhibit their natural shapes. An old stallion's muscles get wasted; he gets drooped in the back, and is otherwise out of shape; the three year old filly has not attained her full proportions. These circumstances should be taken into account, and full allowance given to them. To be a judge of horses' shapes can only be learned by practical experience. The ear alone makes a poor judge: take the eye as your director, and a short apprenticeship will make you a proficient in the business.

There are a few points that apply to all mares, no matter to what class they belong—namely, that they should have blood-like heads, with small muzzles, with the cheek or hinder part of the jaw-bone deep and wide apart, symmetrically set on a lean and moderately long neck; well laid-back shoulders, light at their points and thin at their withers; broad, flat knees; flat, clean legs, long in the forearms, straight in the elbows, short from the knee to the fetlock, with plenty of bone; oblique, elastic pasterns; large, rounded hoofs, with open heels and concave soles; broad, wide, angular hocks; good, rounded ribs; deep chests, broad loins, long hips, well-set tails; and, when standing at ease, her hoofs should neither point inwards nor outwards.

That you may have good nurses (a vital consideration, for without a good nurse you cannot rear a good foal), you should see that, even in maiden mares, their udders are well developed.

The age at which a mare should be bred from should not be less than three nor more than eighteen years. The reason is obvious. Young mares are still growing, casting their teeth, and have quite enough to do to provide for their own wants. Old mares cannot supply that nutriment requisite for the full

development of their offspring. A young stallion and an old mare have produced good stock, but I cannot say as much for an old stallion and a young mare.

Action—our next consideration—should be carefully attended to; for it is the harmony and elasticity of movement that makes weight comparativaly easy to every class of horse, and it also empowers him to propel himself onward with ease to himself and comfort to his rider. It is worthy of particular notice in the mare that the action of the foal resembles the dam's in a much greater degree than that of the sire; consequently you should be guided by the action of the mare in forming an opinion as to the class of horse she is most likely to produce. For instance, racers and hunters should be good gallopers; carriage-horses, chargers, and hacks should be good trotters; and cobs and farm-horses good walkers.

The first style I shall speak of is high-action horses, who step to their chins. I object to these: firstly, when used as riding-horses, they cause an uneasy seat to their riders; secondly, they lose time in replacing their feet; and thirdly, they are apt to become the subject of lameness by the concussion they produce with the force with which they strike the earth. There is, however, one class of horse wherein this style is much valued, and where, also, there is a striking illustration of the preposterous dictates of fashion overruling the better principles of common sense; but, as necessity has no law, as long as Dame Fashion wields the sceptre, we must bow to her commands. I allude to carriage-horses. Have then, by all means, mares with high action when you intend breeding carriage-horses.

The second style I shall mention is that in which horses do not lift their feet sufficiently far from the earth. These are termed "daisy-trippers." I object to these: firstly, from the danger in which they put their riders' necks by their stumbling and tripping; and secondly, in meeting with the least obstacle, they change their feet, and frequently strike one foot against the other, thereby producing lameness, splints, or sore shins. Mares with dishing action, or who forge their hind and fore-feet together, are most objectionable, particularly for carriage-work. I would not breed from a mare similarly affected.

The style of action I would recommend differs from any I have mentioned. It may be known by the elasticity of the horse's movement and the uniformity of his paces; by his elevating and carrying forward his forearm; by bending his knee well, without raising his feet too far from the earth; by bringing his hind extremities well under his trunk; and by not losing time in the replacement of his feet. It is that style of move-

ment that gives to the horse that grandeur of appearance for which his race is so justly prized, and from which the vanity of man receives so gratifying a compliment.

The height of the mare will depend on the class she is in: for a hunter, from 14½ hands to 15½ (a long-legged hunter is never a safe one); for the road, from 14 to 15; and for carriage-work, from 15 hands upwards.

The temper of both sire and dam should be strictly inquired into. A bad or vicious temper is a positive hereditary failing, and one of the worst faults a horse can possess.

Having chosen your mare, spare no expense or trouble in selecting a stallion from her; and, as I said before, let him be young, sound, and possessed of all those good shapes in which the mare is deficient.

The period of heat in the mare, as a general rule, does not arrive before the month of March; but in breeding for turf purposes it is desirable it should be on in February, the age of thorough-bred horses being dated from 1st of January. The benefit of having a foal dropped as close to that time as possible is obvious, as they are called on so early to perform work. The month of April, however, is quite time enough to put a stallion from which you wish to breed any other class of horse; but in every case a strict record should be kept of the dates of her being covered. You will find this useful, that you may be prepared for her foaling, a month previous to which event she should have perfect rest and quiet from all work.

To bring about *æstrum*, or heat, the mare should be placed in a warm stable, and liberally fed with nutritious food. On the symptoms I have mentioned presenting themselves, you may have the mare covered. Let her be kept in a quiet situation without food, for some time: and, above all things, she should be placed by herself, away from other horses. On the ninth day from the first cover, let her again be brought to the stallion, when, as a general rule, she will be found again in use; but in case she refuses, have her again sent on the sixth day; if she again refuses, have her sent on the succeeding sixth day; if she now refuses, let her not be sent until the succeeding tenth day, when, if she refuse, you may fairly reckon she is stinted.

If, however, she takes the horse on the first ninth day, your treatment should be as follows: After being served, let a bucket of cold water be thrown over her loins, and keep her walking about for half-an-hour; then put her into a quiet stable, and keep her fasting for some hours. Have her tried on the succeeding fifth day, when, if she refuses, continue to try her as if she had refused on her first ninth day, as I before stated. If, however, she proves in use, give her a dose of purgative medi-

cine, and, when working it off, have her again served. I have never seen or heard of a case where this treatment proved ineffectual, or where any untoward consequence occurred from its trial.

This treatment, however, is not advisable where the mare has a foal at her foot, owing to the susceptibility of foals to take on superpurgation, which should be in all cases guarded against. With a suckling mare, a good blood-letting will answer your purpose.

The condition in which your mare is when being put to the stallion requires your consideration. A mare miserably thin or in a weak state is quite unfit, neither is a grossly fat one fit, to be sent to the stallion. You will find it a difficult task to have them stinted. Mares in hard-fed condition must be prepared with slop-mash or allowed to run at grass, before they are fit to be served. A mare in moderate working condition is best prepared to be put to the stud.

Mares take, as a general rule, eleven months in gestation; I have, however, seen mares go fourteen months, and others but ten months. In all cases, a month's rest and quiet before foaling is most beneficial.

When the foal comes into the world, it is interesting to observe how soon it begins to suck; in the case, however, of a weakly foal, it may occasionally be prudent to assist it by supporting it to the teats. The first milk, instead of being prejudicial, is beneficial, as, by its purgative qualities, it brings away the contents of the fœtal alimentary canal.

While mares are suckling, they should be well housed and have plenty of nutritious food. I know nothing better than boiled barley and bruised oats, mixed with bran, given at morning and evening, together with a feed of corn daily, for the purpose of breaking-in the foal to eat it. I recommend the practice of giving foals boiled milk and oatmeal daily, while on the mare. This, with good shelter and water, is all they will require until about the end of September, when they should be weaned. A small leather collar placed on the foal, when weaning, is of much use, as by it you may teach it to lead and allow itself to be handled.

After weaning, mares should be carefully attended to; and they should be milked every second day, and their udders hand-rubbed with a solution of alum (an ounce to a pint of water), until they are dry of milk. They should have plenty of water, and should be liberally fed. It has been advised to feed them sparingly until it is evident they are with foal: this I think an erroneous notion.

When the mare is about to foal she should be kept as quiet as

possible, and the less fuss that is made about her the better. Should there be any symptoms of tedious foaling, or any thought that something is wrong, send at once for a veterinary surgeon.

There is one fact which, before I close, I would ask you to study—the natural gift given to the mare or stallion to produce good horses from any kind of stallion or mare. I have known ill-shaped stallions, without character as racers, produce first-class animals from every class of mare. I have seen ill-shaped mares, who never could win a shilling, produce good racers from different stallions; and I have seen well-shaped, first-class racers, both stallion and mare, produce an ugly, useless beast. These whims of Nature we cannot, of course, control; but we can learn the general rules which Nature makes, that, keeping them before us, we may at least assist her in producing the animal we require.—*Abridged from a Paper read to the Athy Farmers' Club.*

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5. *Lime for Wheat.*

As lime, in its natural form of chalk or limestone, is now within easy reach of almost every farming district, and as it requires but little labour to assure a great effect, it may be said to stand in the class of cheap manures or fertilisers. This abundance, and its common use for ages, may have caused its qualities and application to receive an excess of attention in modern times. But, be this as it may, some amateur and professional lecturers and contemporaneous writers, who have evidently more enthusiasm and good intention than practical knowledge, have so pushed their theory of liming, and its effect on soils, that many farmers have been persuaded out of their more sound experience, and now place too much faith in lime. The great value of lime, when judiciously applied, is not questioned in the least, but some have undoubtedly been led to believe that lime may be applied advantageously, that is profitably, in ordinary dressings and at frequent intervals, to almost every kind of soil, and for almost every kind of crop.

This remark follows naturally on what we have recently seen in various parts of this country, and in the Midland Counties particularly, of the preparations which have been, and are now being, made for the next crop of wheat. Lime has been used alike for light and heavy land, after fallow and after "seeds." This cannot be consistent either with the indications of Nature or the rules of art; nor is it in harmony with the conclusions of the best scientific writers.

The matter, however, is really in a very small compass, and

practical men may accurately apply the sound data we have to their variable fields, and the equally variable preparatory crops of them.

In the 'Cyclopædia of Agriculture,' under the heading "Lime" (p. 225), we find this sentence:—"The liming of new soils is, according to this view, merely a mode of converting the useless vegetable matter (composed of roots, fibres, and stems in every form of natural decay) into active manure in the soil itself."

Again (p. 263):—"In Scotland, the effect of an application of lime on the barley crop, especially on soft soils, is to cause a large increase of straw, so that not unfrequently the first crop, after liming, produces an inferior sample of grain. It is also remarkable that the awns are more difficult to detach when grown on a field just newly limed." Regarding wheat, on the same page it is said:—"Wheat is also benefited by the use of lime, still, it must be confessed, not to the same degree as barley or turnips. We have seen a remark by an able professor that wheat comes sooner to maturity on land newly limed than when it is not. But this is quite contrary to our experience, which is, that all corn crops, in a moderately moist climate, are retarded in their ripening from 10 to 14 days by a recent application of lime. The grain is also coarser, but the yield is greater."

In these extracts there is ample to guide any practical man in the use of lime for wheat, although there is a difference of opinion between an "able professor" and the author of the article, whose signature is "J. H." Both, however, were right. According to modern experience the ripening of a crop would be retarded by the use of lime under certain conditions. This is when there was a superabundance of easily digestible vegetable substances, when food for the wheat would therefore be abundant, and, therefore, when the yield of both straw and corn would be increased by the use of lime. On old cultivated land, however, where the pristine deposits of decayed vegetation had been exhausted by corn cropping; on all land which is poor from deficiency of vegetable deposit by the growth and decay of the refuse of green crops, as on land which is too light or dry, or too tenacious for that rapid spread of roots which admits of this deposit becoming great during the ordinary courses of modern close farming; and on land where "seeds"—rye grass, white clover, and trefoil—have to be substituted for red clover; here the maturity of wheat would be facilitated by the use of lime: but the probability is, the quantity of both straw and corn would not be increased, and the quality of both would, in ordinary seasons, be most certainly deteriorated.

The conclusions we may now come to are clear. On all

light-land which is deficient in vegetable substances the application of lime for wheat is wrong. Dusting the surface for slugs is altogether apart from this question of fertilisation. If this light-land has been sown with rye-grass, lime would most assuredly be injurious to the crop of wheat to follow. If, too, this rye-grass has been fed by sheep, it would be all the more so; for the ammonia and uric acid contained in the droppings of animals are powerful solvents of vegetation, even when it may be in the crude form of the matured roots of previous crops of corn. The chemical and physiological character of the roots of rye-grass are, besides, nearly allied to wheat or cereal crops. There is nothing acrid in them which would be better neutralised by the action of a caustic substance like lime. On the contrary, the digestible part of the remains of rye-grass which is left for the wheat to feed on is so readily assimilable by the wheat plant, that to make it more readily digestible by this solvent, lime, would be to do that by art which the wheat plant would do far better for itself. The result generally in similar cases is, that wheat matures before the proper season; the further result is, the straw begins to decay at some part while it is yet alive. This is generally at the root, when the first wind that blows snaps the frail part between earth and air, the final result being what is termed a "root-fallen" crop, and its accompanying defects—a short yield of inferior quality. Early maturity or ripening before the due season, when this does not arise from a maggot in the stem, is the cause of root-falling in nine cases out of ten. Lime, by the way it makes the food consisting in the preparatory crop more readily digestible, is a powerful agent in inducing this disease.

Stirring such land as has grown peas, beans, or white turnips, and thereby exposing the roots of these crops—the food of the following crop of wheat—to atmospheric action has the same effect; they become unduly oxidised, carbonic acid is more readily formed, the solution containing them in a decomposed form is more readily assimilable by the wheat plants, as indicated by rapid growth in the autumn or early spring, whereby the stock of food becomes exhausted in May at the very time when the feeding and the digestive powers of the crop are at their largest stage of development. It must be a very exceptional piece of "sour" or tenacious heavy-land, if pulling or chopping the annuals off with a hoe would not, on the above grounds, be far better for the wheat than any kind of stirring or cultivation. On the same ground, one furrow, rolling down close, sowing the seed, rolling again perhaps, and then harrowing up, is agreeable both with practice and the teachings of science.

Where lime may be used, consistently with the above views,

is where the clover root is in excess, and there are indications of a previous large deposit or accumulation of vegetation or its remains. On pure red clover, after a heavy crop, lime may be occasionally freely used; but this is when there has been a humid and wet season, and it was previously known that the soil was likely to produce a rank or dark-coloured foliage. But then it would have been better to have limed for the clover. When rye-grass has been grown, the only exceptional instance where liming may be judiciously practised is where there is clear evidence of rankness or sourness. Semi-aquatic plants, as gye or king-cup, or butter-cup, and other plants of a similar nature, will point this out; where these grow vigorously—lime. On drier soils sorrel is a good indicator; lime will kill sorrel by starving it, making the food that would otherwise be left for it to feed on disgestible to and assimilable by cultivated plants. In all these cases, however, it would have been better to have limed for the preparatory crop, that the substances which are now unsuitable for the wheat might have been converted into wholesome food in the organs of the cultivated crop.

When fine red clover land has, from some unavoidable cause, to be ploughed late in the season, a good sprinkling of lime would be serviceable, but this should be applied immediately after the plough, that the acrid acid, which this root contains, might be neutralised in the bed for receiving the seed. Turnips will not plant immediately after a crop of vetches. The cause is the same, as also is the remedy. Powdered chalk would act in a similar way, but not so rapidly. It is not because red clover land gets more solid by laying a month after ploughing that it is more likely to admit of a full plant of wheat, but it is because the seed-bed-to-be has had the roots of the clover and the juices they have voided exposed to the air and undergone a given amount of oxidation.

Wheat, like barley, or any other cereal, will plant better in a loose mouldy bed than elsewhere. The after-growth in such a case is not the point here in question. Wheat grows better as a rule, however, after red clover—because the roots of that plant are larger and less soluble than other preparatory plants, and, therefore, because the wheat crop has a store of food remaining well up into May and June. This is a chemical and not a mechanical question. Wheat will plant well if sown at once after a clean white clover root has been ploughed: after red clover, even if equally clean, it will not, as a rule, do so.

These data afford further signs for liming with discretion. When there is no doubt about the wheat planting—apart from any mechanical or insect considerations—there liming would injure the crop. When there is a doubt—chemically considered

—about a plant, there a light dressing may be well applied: but the heavy dressing here really required for the good of cultivated crops generally should be left over till the crop following the wheat.—*Abridged from the Agricultural Gazette.*

6.—*The Exhaustion of the Soils.** By A. De la Morvonnais.

Practical agriculture differs in no way from every other industrial enterprise. The artisan and the manufacturer know that their establishing and working capital must not be continually reduced if they would carry on their business. Thus, the cultivator cannot continue to derive any profit except by restoring to the soil, under the form of manure, what has been taken from it under the form of products.

Such is the grave question which the publication of a book by Baron Liebig, entitled 'Les Lois Naturelles de l'Agriculture' ('The Natural Laws of Agriculture'), has made the order of the day.

The question is definitively, according to Liebig, What will be the course of events in Europe if the produce of the fields diminishes year by year? for no one can reasonably think that Providence condemned the European nations—now the depositaries of civilisation, as the Greeks and Romans were formerly—to fall into poverty and barbarism after the accomplishment of their mission; or that it is for that reason the Creator implanted in the people the idea that land is inexhaustible in its gifts, and that the Divine laws watch over the perpetuation of the human race.

That evil is always the greatest, according to Liebig, which does not think itself to be an evil.

The history of all places and times furnishes us with numerous examples of the exhaustion of soils; and we could point to provinces to-day completely sterile, which formerly were noted for their high fertility.

"How is it," said Liebig, "that the countries bordering the Mediterranean have been gradually depopulated? and what has caused the desolation of certain countries, such as Asia Minor, Greece, Italy, &c.? The exhaustion of the soil."

Ignorant people, who are in the habit of attributing the fluctuation of the population to peace and war, explain all these facts in that manner. But peace does not nourish a population any

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* Translated expressly for the 'Mark Lane Express,' from 'l'Echo de l'Agriculture.'

more than war destroys it, for they only exercise a passing influence over them; but what really collects or disperses human societies is the fertility of land.

Columella and Varro attest the exhaustion of the soil put into the hands of slaves, and render them responsible for the proceeds of its culture.

The cultivator is the free and independent man *par excellence*, when his fields are not too extensive for him to farm by himself, with the aid of his children, and his land is sufficiently fertile to pay taxes, as well as procure his family a sure and certain subsistence; but when, in consequence of the exhaustion or impoverishment of his land, the free peasant disappears, his patriotism subsides, and he leaves the soil which he cultivated—the land which gave him birth.

The means employed by the Roman legislature for contending with this evil, and which were constantly re-enacted in the centuries following, are extremely instructive and interesting but neither the division of the land, enforced under Caius Gracchus, nor the efforts of Julius Cæsar and Augustus to re-establish the equilibrium disturbed between the wants of the population and the production of the soil, or between hunger and the fields which could no longer satisfy it, were productive of sensible results.

A similar phenomenon occurred in Spain, under the reign of the Roman emperors. Spain was one of the richest countries in the world. Titus Livius and Strabo speak of the rich harvests of Andalusia, which yielded a hundred-fold. Under the dominion of the Moors, Spain was the most thickly populated country in Europe. Tarragona, which was the second city of the Roman empire, then numbered upwards of a million inhabitants; and afterwards, under Abd Errahman, contained 350,000; but now only 15,000. In several of the Spanish provinces the land only yields a crop once in two years, while in Andalusia it is only every three years.

But, to come nearer our own times, how is it that all the old estates in the east of America, untrodden lands, which have only been cultivated for a comparatively short period, and which astonished Europe by their fertility—how is it, we repeat, that all these countries have become sterile; and yet, for all that, the climate has not become inclement, the air which surrounds them, and the water which bathes them, are still the same? It must be that the soil is deprived of a principle which the regulating operations of natural agents cannot reinstate. They have been impoverished by culture.

[illegible] these considerations, borrowed, for the most

part, from Baron Liebig's book, to the actual observation of facts; for the exploration of a natural phenomenon is at once an affair of science and observation.

The doctrine of Liebig has been very learnedly treated by M. Maluguti, senior member of the Faculty of Science at Rennes, who made it the subject of a course of lectures on agricultural chemistry in 1865.

By the fertility of a soil is meant the whole of those conditions which result in an abundant crop; and by the productive faculty of a soil is meant the whole of those conditions which ensure the continuance of a yield.

A soil is productive, when under its surface, as far as the roots of vegetables extend themselves, it contains all the elements necessary for the nourishing of such plants. It is fertile when it gives a good crop.

Independently of the physical and geological composition of the soil, we see first that a knowledge of the rooting of plants is the basis of agriculture, and under that head it is necessary to say that very little is known in general. The working of a soil ought, in fact, to be exactly appropriate to the nature and properties of the roots of the plants you wish to cultivate. Besides, it is the nature of certain grains—such as wild-oats, couch-grass, &c.—to preserve themselves under the arable bed exhausted by the culture of cereals, and to appear at the surface, there filling the place of seeds to which the soil no longer offers nutritive substances.

This is the cause of the invasion of weedy grasses in a great number of fields abandoned to ruinous culture and a succession of cereals, especially those where the abuse of carbonate of lime has already ruined the temperament of the arable bed.

Nevertheless, it was a conquest of the cultivator who discovered the action of calcareous marl introduced into certain soils, until then unproductive, from the culture of several plants, especially wheat.

Vast beds of carbonate of lime, under different names, were discovered thirty years ago in Brittany. Fertility seemed reproduced in certain districts. For instance, we may mention that of Dinam, where Count de Lorgeril discovered the shelly basins of Saint Pivot, and brought it into use, under the name of "sandy chalk."

M. de Lorgeril took care to state that to the knowledge of the inhabitants these beds had never been worked till then. But from the appearance of certain parts, there were visible traces of former openings; and even tradition tells us that the Romans, and perhaps our fathers the Gauls, had used carbonate of lime to

a vast extent; and no doubt the same abuses now practised caused its abandonment then.

Sea mud manures far more completely than sandy lime all lands where a previous abuse of it has rendered the soil sterile.

What must be done, then, to prevent this exhaustion of land?

We must put into it what has been taken from it; and if the intensive culture, so extolled in the present day, is employed in the art of impoverishing the soil, in order to avoid this fatal consequence, we must look beyond the products of cultivation for the matters necessary to cover the deficiency between the receipts and the annual expenses of the farm.

The method of restoring to the soil those elements taken from it by cultivation is so simple that it is astonishing it was not thought of in the last century; but still, the knowledge possessed by the farmer of the necessity for manuring land proves that the idea of restitution existed, though only in the germ.

As plants etiolate at once, if removed from the action of light and water, it was thought at first that these two elements were necessary to the existence of them; afterwards it was believed that crops would never be deficient if the land was properly manured.

Later on, it was imagined that the element of production was humus; and consequently, the cultivator who could produce the greatest quantity of that matter was the most successful.

It was remarked, however, that certain agents of a mineral nature, such as marls, plaster, &c., increased the crops; from which it was concluded that these substances were stimulants. As an element of production humus stood first—it gave a great development to the culture of fodder plants. Besides, it was found that cereals attained to greater perfection after fodder plants, from which fact people drew the conclusion that cereals were exhausting to a soil; while, on the contrary, fodder plants helped to fertilise it.

At that time, practical men attributed all to manure; and, exaggerating the notion of equivalents, they thought if grasses were put into any kind of soil the result would be the same—it would produce an equal quantity of manure, while the contrary effect would be produced by the cereals.

Thanks to these false theories, agriculture was at a standstill, and alarm was felt everywhere, when the use of marl and plaster once more gave good crops; but the productive faculty of the soil soon became extinct.

At that time, although the nature of air was known, scientific men were ignorant of the fact that it is the source of hydrogen and nitrogen.

By analysing the elements introduced into organisation, it was found that the urine and solid excrements were composed of the mineral elements of food, mixed with other matters which did not add to alimentation. This discovery led to some experiments of the action of manures upon vegetables, when it was soon found that dung put upon a soil could not restore to it all the elements that had been taken from it by cultivating cereals.

Now, it is generally admitted that all plants are of a mineral nature. Some of their principles exist in the air—others in the earth, while these two elements always exist in a solid form in the plant. It will therefore be seen that it is only through the decomposition of their mineral elements that manures act upon vegetables.

According to the doctrine of M. de Sausure, it was believed that wild plants derived their nourishment from the carbon distributed in the atmosphere, and cultivated plants from humus; but Liebig taught us that all the carbon contained in plants came from carbonic acid, and it was that idea he expressed by the circulation of oxygen. The carbonic acid is absorbed by plants, which exhale the oxygen and retain the carbon.

Oxygen assists the respiration of animals, and, being exhaled by them, is again appropriated by plants. We also learned from Liebig that plants derive all their nitrogen from nitric acid; consequently the circulation of that element is produced in the same manner as oxygen. Carbonic acid combined with nitric acid transforms itself into the economy of urea; while urea, in its turn, transforms itself into carbonic acid combined with nitric acid.

Theodore de Sausure knew that phosphate of lime was necessary to plants, and it is the same with phosphate of magnesia. Sprengel discovered the presence of alkalies in the vegetable economy; but, as they all admitted that plants drew their nourishment in the soil in a state of solution, it was thought that these elements must enter into them, whether they were needed or not. We see now the fallacy of this opinion; for the cellular tissue can only form itself with the aid of carbon. Without carbon, neither fecula nor sugar could be formed; and without phosphate, albumen could not be formed.

M. Malaguti, in his second lecture on agricultural chemistry, says: "There exists in the remotest part of Asia a vast country presenting the different climates comprised between Central Germany and Lombardy." The land is of volcanic origin. The mountains there are formed of a very stiff clay; the soil of the valleys is nearly 16 feet deep, and rests upon an impermeable subsoil, where some artificial fens are formed.

From time immemorial, the fertility of that country ha been disputed, and that in spite of the absence of all agri societies, meetings, agricultural communities, &c., and, still more, without any cattle market, or the least import artificial manures.

This country is Japan.

If these countries enjoy unparalleled richness, it is du idea of restoring to the soil those elements which have bee from it.

The Japanese has no cattle, because he could not milk; and he does not eat meat, and therefore would get r from his beasts. All the land belongs to the sovereign some nobles of high degree, who give the lands in fiefs t of an inferior class. The latter, in their turn, farm then peasants, in lots of five or seven acres or more. As the pr are small, and divided by a great number of canals for irr they do not serve advantageously for milch-cattle: they, th only keep sheep.

The Japanese farmer is ignorant of the aphorism, fodder, many cattle; many cattle, much manure; much much corn."

But they say, The principles which constitute a crop partly from the soil and partly from the air. The la brought there by the force of natural laws, and the first introduced into the soil. Human excrements only repre part which is derived from the soil; and from that t clude that those who consume the crop become the prod manure.

It is, then, because they use human excrements that th never fall off. No trace of the manure is ever found on t but privies are constructed in every street for the purpos lecting it.

It must not, however, be supposed that no other m used by these people. As there is always some loss matter in a crop, while respect for the dead deprives th part of its fertilising elements, they employ other manur as they use enormous quantities of fish, they put the *deti* the soil. They also form a compost with chopped straw, refuse, and the clearings of fields, which is covered o earth and cut straw, and moistened constantly. After time putrefaction commences, when they break up the h by that means obtain good vegetable mould.

In order that it may be thoroughly used, they man plant particularly—that is to say, they open furrows, sow and cover it over with manure, thereby avoiding the nec

spreading it over the whole surface, as we do; and their fields never remain fallow. That is due to human excrements; and it is the same in China.

But let us leave these countries, and see what was passing in Europe in the middle of last century. Take France for example:—

About 1760, the cultivator had no other winter fodder than carrots, turnips, and a little straw, from wheat or rye. Butter and milk were both very bad in quality. They had to wait till the spring before they could let their cattle into places where the grass was at most only an inch high, and the animals returned as starved as they went out. This is what our agriculture will come to if we do not take care.

About that time Schubert introduced the culture of clover; for a time, this supplied the loss of other fodder, but after a while the yield diminished, till at length they could no longer grow it upon the same land.

Then appeared guano as an artificial manure; I shall not speak of the animal black, the quantity of that used being much too small to influence the destiny of agriculture. But thanks to the use of this manure, the crop of clover became much larger; France once more recovered her productive faculties, but soon clover again began to diminish in yield, when gypsum (thanks to its action, the nature of which we are still ignorant of) rescued the farmer once more from loss by increasing the crops of that leguminous plant.

Thus clover, potatoes, and guano have hitherto prevented the ruin of agriculture, particularly the potato, as it will grow upon a poor soil, and vegetate where wheat would not sprout. It must not, however, be supposed that potatoes prevent the exhaustion of the soils, quite the contrary; but as their roots force themselves to a greater depth in the earth than wheat, they find nourishment where the short roots of that cereal could not reach.

But though the introduction of the potato has been beneficial in some respects, it has also been the source of a great evil on the Continent, by favouring the exchange of its manure for gold from England. Besides, the use of potatoes as the sole aliment of certain populations is one great cause of the decrease in stature of the human species. For instance, in France the height of soldiers in 1789 was 5 ft. 6 in.; in 1823 it was 5 ft. 3 in.; and now the regulation height is only 5 feet.

In Germany, says Liebig, where the people feed almost exclusively upon potatoes, the diminution of height is still more marked. In 1760 it was 1 m. 78, and now it is 1 m. 55. In Saxony, out of 1000 conscripts there were 716 unfit for service, and 317 rejected as under height.

The bony substance of men has been exported to England under the form of animal charcoal.

Another cause of the slow decline of agriculture is, the discovery of guano. Let us suppose, said M. Malaguti, that 1 cwt. of guano furnishes in five years 5 cwt. of wheat more than would have been obtained without the use of that manure, the importation being about 2,200,000 tons in fifteen years, the result would be that 1,800,000 individuals would be well fed, thanks to guano, for we might put any other production as an equivalent in the place of wheat.

But guano, too, will come to an end, for all that has been discovered is in working, consequently the mass diminishes more and more.

The discovery of fossil phosphates has also brought fresh help to make up for the insufficiency of bones, but that source will soon become exhausted; and besides, phosphate alone will not afford nourishment for plants, it must be mixed equally with potash and soda.

"We must only attend to ourselves," said the poet; and when populations have become familiar with the simple laws of nature, respect to which will guarantee their future well-being for all time, when they learn to know that each cultivator is capable of maintaining the fertility of his land without importing manure, and that if that importation depends upon foreigners, the actual state and increase of crops and subsistence are subject to fortuitous events, over which populations have no control; when, in fact, it is proved by statistics that under the most favourable circumstances the importation of manure must come to an end at no very distant period, they will know how to solve the question of the sewage of towns, upon which the preservation of the riches and well-being of the state as well as the progress of civilisation depend.

7.—*Feldspar Prepared for Manure.** By Jules Gindre.

The new manure which I present is entirely mineral, and is a direct application to agriculture of feldspar and feldspathic rock, which may be considered as an inexhaustible mine of potash by reason of the importance of the deposits of pigmatite—those of syenite, which are essentially rocks of feldspathic potassium, and on account of the position held by feldspar in the composition of granitic rocks, and of eruptive rocks, properly so called. It is also from the decomposition and deterioration

* Translated expressly for the 'Mark Lane Express,' from the 'Journal d'Agriculture Pratique.'

of these different rocks that the potash is derived, with which the generality of soils of the sedimentary formation are impregnated.

According to the extent of the crystalline deposits, and the proportion in which the feldspar is found in relation to the quartz in the pigmatites and to the quartz in mica, granites, and gneiss, we may admit that the mineral potash enters for about one-fifth into the composition of the solid parts of the earth. Its position in alkali is very remarkable: since, according to the analysis of Messrs. Berthur, Gustave Rose, Bendant Malaguti, &c., feldspar contains variable quantities of potash, say from 12 to 16 per cent., which gives from 19·2 to 25·6 of carbonate of potash-*anhydrite.*

The agricultural importance of potash is well understood; it has been pointed out by chamists and the most eminent cultivators, and its ancient name of *vegetable alkali* bears witness to the attention that has always been paid to it. It is classed with the most energetic vegetable agents, and we have often sought for the means of procuring this alkali in quantities suitable to arable lands, whether to repair the extractions made each year by the crops, or to enrich those soils that are insufficiently provided with it. The rubbish collected upon the waste land, the marl, the lime, the waters of irrigation, the rain, and even the dust brought from far by the winds, undoubtedly supply appreciable quantities of potash; but it is, in general, rarely that these compensations are found sufficient. Vegetable ashes, which owe to potash the great portion of their vegetative properties, are, as a whole, an extremely limited resource, and in almost all cases they come back to agriculture only in the state of lixivied ashes—that is to say, deprived of what constituted their principal value. Independent of the potash expended by domestic use, the requirements of the manufactory absorb considerable quantities, and up to the present time almost the whole of it is furnished by the incineration of vegetables.

In his researches into vegetable chemistry, M. Payen has discovered that azote appears to be superior in importance to oxygen, hydrogen, and carbon, having ascertained that azote is in greater abundance in the vegetable tissues when young, and possessing a greater vegetable energy at the extremities of the young shoots, buds, and radicles.

The same pre-eminence may be attributed to potash over other mineral matters that enter into the composition of vegetable tissues, the analysis of ashes indicating always increasing quantities of potash, in passing from what is called the perfect wood to the alburnum, the branches, the twigs, the arms, the

young shoots, and from these to the leaves. This alkali appears, therefore, to co-operate powerfully with the vegetative impulsion. However, if it is admitted that vegetables obtain their azote from two sources, namely, the soil and the manure on the one part, and the atmosphere on the other, it is equally certain that the mineral matters can be furnished only by the soil; what the rain and the dust supply may be put out of the question.

Although we are still ignorant of what is the true nature of the substances that constitute mineral matters that are found in the sap of vegetables and in their tissues, it is not the less clearly ascertained that their action is most essential, whether in relation to the health of the vegetable, or that of the economic value of the product we derive from its culture.

In this notice I ought to limit myself to mentioning the action of potash; and we are aware that some plants are more specially designated under the name of *potash plants*, on account of the strong dose contained in the ashes. The quality of the produce appears to depend much upon the greater or less richness of the soil in alkali. The potato, the sugar-beet, the turnip, the Jerusalem artichoke, are especially potash plants; and to the list we ought to add the vine and the tobacco. In the first class, the vine, the vegetation of which is always so much the more active and healthy, and the quality of the produce so much better,* from the application of a sufficient proportion of potash to its roots. Those soils sufficiently furnished with potash add bunches to the vine, and the produce is enormous when the culture admits only of small doses of organic manures, but requires, above all, an abundance of mineral manures. Tobacco, the cultivation of which has become already of so much importance in France, and which ought to be still further extended, requires a soil rich in the potassic element, although it is classed amongst the lime-plants. From the analytical researches of M. Schloesing, director of the tobacco manufacture of Paris, we are taught that the leaves ought to contain a certain portion of potash, in order to furnish tobacco of good quality, and that the inferiority of the tobacco from certain countries of France is owing to the poverty of the soil in alkalies, which is as much as to say that they are produced in a soil insufficiently supplied with potash.

In consulting the analyses of M. Isidore Pierre, in his 'Agricultural Chemistry,' we see that the strong diffusion of potash in the ashes furnished by different crops bears further testimony to the importance of that alkali. The ashes of wheat contain of it from 24 to 29, and even 33 per cent. under certain circum-

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* ...the Rhenish Provinces and in Herault, they obtain good results from the ...d lucerne fields by the employment of decomposed basalt.

stances. The ashes of leguminous plants hold variable quantities of alkali, ranging from 22 to 45 per cent.; and in those of colza and linseed the proportions are from 22 to 25 per cent.

According to M. Boussingault, the quantities of potash taken from the earth per hectare, by an average crop, are,—

For potatoes	63½	kilogrammes.
„ beetroots	90	„
„ turnips	40	„
„ Jerusalem artichokes	140	„
„ wheat	26	„

The subtraction of potash by each crop of wheat may be increased to 38 or 45 kilogrammes per hectare, increasing as the crop reaches 16 or 20 hectolitres. The ashes of the vine-shoots, analyzed by M. Boussingault, contained a little above 20 per cent. of potash, which represents 32 per cent. in carbonate of potash, a quantity to which we must add the appreciable dose of alkali taken to the soil by the residuum of the grapes and by the vine itself. In most cases, and by an average crop, the previous abstraction of potash per hectare of vine ought not to be less than 60 kilogrammes.

If for domestic leguminous plants lime appears to be a pre-eminent element, their ashes containing 26 per cent. for white trefoil, 37 ditto for red clover, and 50 ditto for lucerne, the action of potash is not modified in it, since it is represented by 14 per cent for lucerne, 27 ditto for red clover, and 34 ditto for white trefoil.

Living in a country having a granitic soil, and for a long time engaged in working materials for porcelain, I have always been in the midst of the mass of alkali, which is one of those constituent elements, and without stopping to entertain the idea of an extraction of the potash in a commercial form, which has been effected at different intervals by skilful chemists, a problem not solved (at least, in an industrial point of view), so surrounded is the subject with difficulties, I have employed myself in searching for the means of arriving at a specially agricultural application of it, which is inevitably more important than the elaboration of the potash as a product applying only to manufacturing purposes. This alkali is a vegetative agent, in every respect most essential to agriculture, whilst it is only required by a few manufacturers. The agricultural products of France exceed in value seven thousand million francs (or 280,000,000*l.* sterling), whilst those of its mineral manufactures are about one-tenth of that sum.

In order to render easy and practical this application of the feldspathic rocks to agriculture, it requires that the potash should not be isolated in combination with the stony matter

which constitutes the feldspar, and would but ill sa
grand requirements of vegetation, but merely render it assi
In consequence of investigations into the vegetative p
of old country mortars made with sand and feldspat
I have found out what eminent producers of soluble
potash these feldspathic mortars are, and how much t
pass in vegetative action the old mortars made with
sand, which yield only azotate of lime, and contain
very small quantity of potash, furnished by the lime wh
argillaceous.

After experiments, followed up during many years,
arrived at an elementary treatment, which consists c
a kind of cementation of the feldspar by the lime, whi
stopped at the point at which would commence a loss o
but which sufficiently changes the relation of the basi
double silicate, in order that under the influence of th
of the atmospheric agents, of the carbonic acid wit
the air and water that impregnate the soil are more
saturated; and of the organic matters, there was a dis
the elements of the silicate of potash, and a formation o
and carbonate of potash, which in presenting themse
in the nascent state, and in some respects, in proportion
wants of the plants, are found in vegetative conditions
favourable.

The *feldspar prepared for manure* being in dust of
tenuity, that definitive and productive decomposition of ve
salts is continued progressively up to the complete destr
of the stony silicate: each grain of feldspar kaolinises
degrees, thereby giving birth to clay, to soluble salts of
and to soluble silica. The phenomena of transformatio
effected only successively, and by layer in some way, a
out appreciable thickness, it follows that this is es
admirable manure, which in the meantime is felt by it
the first year, as demonstrated by multiplied experimen
the vine and hoed plants. The duration of seven or eig
which I have assigned *à priori* to this manure, accordin
examination of feldspar experimented upon, is confirm
his time by practice, and the quantity to employ for a
hat duration is from 3500 to 4000 kilogrammes, acco
he average amount of potash annually abstracted from
and basing itself upon the mean minimum amount
eldspar employed, 11 to 12 per cent. of potash,
uivalent to 17½ or 19 per cent. of carbonate.

The multiplied experiments I have instituted have
demonstrated to me that *feldspar manure* may be applie
crops [illegible] arborescens or herbaceous; and I have be

particularly engaged with its application to the vine, for which it is a special manure, always easy to apply properly. In all cases in which *prepared feldspar* has been applied to it, there has been a noticeable increase in the activity of the vegetation of the first year; and it has appeared that those parts of the vine that had received the feldspathic manure had suffered less from the *coulure* (falling off of the fruit) than the rows left out.

Fruit-trees, peaches, apricots, and prunes having received feldspathic manure, have shown an increase of vegetation to a remarkable extent; and, as with the vine, we are enabled to state an improvement in the quality of the produce. I may, above all, mention the good effects upon apple-trees, whether recently planted or when they had acquired their greatest growth. In other respects, all fruit-trees, in order to yield produce of a healthy and good quality, must receive farm manure only in very small doses. The potassic element appears sufficient to complete the quality of the fruit as well as to stimulate vegetation. Applied to the alimentary legumes (haricots, lentils, beans, &c.), the feldspathic manure has increased in a remarkable manner the quantity of *siliquas*, or fruit, without exhibiting any excessive increase of vegetation.

I shall again cite essays on the potato and the turnip. For these two plants, the action of feldspar bears especially on the number and size of the tubers in the potato, and upon the bulbs in turnips, at the same time giving to the exterior parts a more vigorous vegetation and a dark-green tint. The roots (or bulbs) of turnips had a more solid and less watery pulp than those growing on land that had received only farmyard manure.

Feldspar, prepared for manure, may be employed alone, mixed intimately with vegetable earth; but it is in all respects preferable to put it in compost with dung or any other organic manure, carefully prepared under a well-aired shed. It is above all, for annual or herbaceous husbandry that its employment in compost made with ordinary dung appears suitable. For the compost intended for the vine or fruit-trees a proportion of vegetable mould or the scrapings of ditches appears to me proper, to replace the farmyard manure; and in both cases, by the employment of compost we complete the operations favourable to the formation of the soluble salts, and nitrification.

It is not in competition with organic, azotized manures of the farm or of commerce that this mineral manure presents itself, as is the case with the feldspathic rocks. It is too well admitted and acknowledged that the farm manures are fundamental, and cannot be superseded. The prepared feldspar is brought forward,

on the contrary, only to complete and supplement the insufficiency of these, in salts of potash.

The name of the new product which forms the subje notice, its nature, origin, and the real importance of the which furnish the matters of it, measure the degree of which ought to be accorded to the *feldspar with a pota prepared for manure.* The first matter can never fail; new economic conditions afforded by railways ought t facilitating its employment.

The well-accepted idea on the composition of the fel rocks, the origin of potash, and the acknowledged impo this vegetative agent, on the one hand, the in-all-respects results of my experiments, long continued and multi the other, have not appeared to me motives sufficient me in immediately recommending its employment culturists—that is to say, to seek for customers for its I have, in the first place, put myself in communicat a sufficient number of practical farmers, of the dis Bordeaux, Agenis, Armagnac, Toulouse, Lower La the environs of Bayonne, and even the Pas-de-Calais sugar-beet), who have most willingly granted me their a by accepting, gratuitously and free of carriage, sufficient of not less than 50 kilogrammes (1 cwt.), and which cases have been 100 to 200 and even 400 kilogrammes. add that the good results of these experiments, wh especially showed themselves on the vine, have led to mencement of a regular sale.

Itxasson, near Bayonne.

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8. *The use of Alkaline Salts in Agriculture.* By CORBEILLER.*

ANOTHER inquiry upon the question of manures has rece set on foot, showing what solicitude the Government fe wants of agriculture. In all parts of France, the author displayed the disastrous plagues which consumed prac ture, officially disclosing the abuses in the trade of manures, and pointing out the incessant efforts of certa facturers to place at the disposal of the soil a quantity hitherto neglected, to the great detriment of the France.

They put in order all those disgraceful traffics, to t

* Translated from the 'Journal d'Agriculture Pratique' expres 'Mark Lane Express.'

of which, for the want of instruction, knowledge, and working capital, our rural population is exposed; and, in spite of the evidence of facts, as well as the seriousness of the usurious excesses of certain bonders, the general conclusion of the honourable commission was that it is better to give entire liberty to commerce in manures, persuaded, as all its members were, that agriculture in France is no longer in an infant state, and that, strong in its knowledge and intelligence, it will become more and more capable of guiding itself, able to distinguish the false from the true, and detect almost instantaneously the dishonest or disloyal manufacturer. Every sensible man must approve of that broad way which reveals to his own eyes the agricultural manufactures. But if agriculture refuse to be guided by a repressive hand, proud of what it already knows, it seeks advancement in its studies, and demands from science and its representatives redoubled zeal and activity in order that it may be enlightened by their discoveries. The works and acts of Nature must become more and more clear to the eye of the cultivator, greedy of knowledge. What formerly was complete mystery becomes now a natural act of vegetable life; laws preside from the birth to the full development and whole existence of plants as well as animals. The wants and exigencies of each family are made known, and the conditions, like the materials necessary to each plant for completing its destiny, are nearly all known.

When a seed, after having found a suitable soil, has produced the new being upon which the hopes of the cultivator rest, it requires a complex nourishment. Azotic and mineral substances all in a particular state of assimilation have been tried. There is the whole secret of the agricultural question. Farm manure is the universal compost, the complex and complete aliment. But there is not sufficient manure for the consumption required; that is the evil. Hence we have artificial manure, the thousand-and-one guanos, the universal panacea which pertain to the industrial manufacturer.

It is against these supplementary manures that one universal cry has been raised. With the exception of Peruvian guano and the products of some houses, who justly claim reputation for honesty, we find a crowd of mere pretended improvers of the soil.

However, next to the azotic matter furnished by the excrements of animals, and fecal matter mixed with straw, and herbaceous litter, which according to M. Malaguti himself, ought never to be held in the first rank, what is wanting far more in a soil after having been for a long time productive, are mineral substances such as carbonate and phosphate of lime, magnesia, soda, potash, &c. The fact that a soil does become destitute of mineral sub-

stances after long-continued cultivation has been point
all times. Our ancestors the Gauls, as well as the Roms
to resolve that problem, and led the way for us to follow.
and liming was the first step made on the broad road of
but there it is the cultivator himself who is the marler ar
He took the first substance required from the soil or f
producer, and, deceived neither in its quality nor its
always obtained good results, whilst he conformed to th
sage experience. In the latter century Franklin taught u
of sulphate of lime, and there again the cultivator uses
matter, after it has been submitted to a simple preparatic
in nowise changes its former nature. Now, in our time,
men have carried out the Gallic method, and sought to
new elements hitherto overlooked. Phosphates are no lo
into the hands of farmers mixed with inert matter such a
charcoal and its adulterations, but even in the state o
phosphate of lime, put into a condition for assimilation
out by experience and controlled by science. Thus th
phosphate of lime has gained a great step. The cultivat
it is needed for his crops, and when he buys it, he does
deception, because he has simple means at his disposal fo
the honesty of the vendor. In a few more years its use
as common in France as that of marl.

But that method of making the farmer manufacture
manure is not perfect. There will be yet wanting in
mineral elements that the culture of beetroot and potato
more and more indispensable. Salts of potash, soda, a
and even magnesia hold an important place hitherto n
and will become increasingly valuable when *intensive* c
more general in our country. For that reason M. Ca
published a small work, in every respect worthy the att
thoughtful men.

This small tract is a tissue of facts and scientific and
researches upon the character and action of alkaline salts
complete and reasonable paper, a compilation of all
proper to the cause, a verification of all the advice of
competent men, French and foreign, as MM. Boussingault
Kulmann, de Gasparin, &c.

The evidence of utility is the first conclusion, but it
sarily a second which permits to practice the possil
applying the lessons of theory, and it is to that second
the author principally addresses himself, by making k
the cultivator the source from which he can best obtain
substances at a moderate rate. These sources are the
salts extracted and drawn from the mother-waters,
abandoned by our salt works in the south, and which

delivered either in a state of common salt, or sulphurated alkaline manure. Through the medium of salines, the sea would yield in France annually 100,000 tons of manure, containing nearly 15,000 tons of potash, 10,000 tons of magnesia, and as much soda. From such quantities of alkalies, obtained economically, either in a state of silica, sulphate, or soon perhaps carbonate, employed by our rural population, our deficiencies might be supplied, the exhausted lands revived, and culture abandoned for being unproductive in consequence of the exhaustion of the soil, again renewed.

The inquiry into the manure question has already revealed to us the immense sources of sulphate of ammonia, phosphate of iron, and magnesia that the manufacturers of Paris, Lyons, and Marseilles have been compelled to obtain from fecal matter and drains. The price of these substances, for a long time appreciated, but always beyond the reach of the cultivator, is becoming more and more accessible, and may fill up that immense gap which exists and prevents the possibility of obtaining mineral substances, such as potash, soda, and magnesia, in a pure state.

After a careful perusal and study of M. Cartier's little work, the reader may draw this conclusion: that the cultivator can now procure himself all mineral elements essential to agricultural plants at a reasonable rate and in a primitive state, so that he can mix them according to the requirements of his soil or crops.

Marling, liming, and plastering are old and good practices; the use of phosphate of lime has taken the municipal right in our stables and dung heaps; the complement of mineral substances is now a thing accessible to culture by the aid of alkaline salts.

Now all these elements, brought to our doors in a pure state, are just the same as we buy in artificial guanos; only instead of inert substances being mixed with them, adulterated with sand, brickdust, peat, &c., we can buy them cheaper one by one, and introduce them all into our manufactures as they are required. This manufactory is our dung heap, which is the true and most active factory for fermentation. There all the reactions take place, having been tempered and regulated by the manure pump. Agriculture may yet gain one thing by this mode of procedure; it will avoid the frauds and deceptions, besides diminishing the cartage of these masses of manure, and rendering them richer, more complete, more active, and less bulky.

9.—*Eggs.*

We know of no article of consumption in the import accounts of the Board of Trade, upon which we can place our finger, that will show a greater or more continuous increase than the simple unit of the egg. Unimportant as it might have appeared some years ago, it has gone on from thousands to hundreds of thousands, and then to millions, until the quantity seems incredible, and could only be realised in extent by the measurement of tons weight. All this represents so much food required by the necessities of one portion of the population, or the luxuries of another; for the frugal and solitary breakfast of the man of letters, or to mix on the table with the more numerous viands of the social family party; or to be called into sudden requisition in aid of the housewife when the casual visitor steps in. These are the ostensible signs of consumption, but the egg appears everywhere, and yields to every turn of the culinary art—in pastry of all kinds, in confectionary, in the making of ices, sometimes in medicine; and, when in a state unfit for the table, it refines our sugar, or softens the leather that preserves whiteness to the delicate hands of the fair sex. All descriptions are eatable and nourishing, but it is only the egg of the domestic fowl that enters into general use. In some of the villages along the rocky portions of our coast, the season when the sea-gulls hover in swarms about the ledges of the rocks is for them a time of plenty; and there is danger and romance about the mode of their collection quite unknown to, or ever dreamed of by, the farmyard peasant or the servant of the commercial incubating establishments. Our home-producers, as a class, are probably not much given to the study of figures, or they might be struck with the vastness of the importations, of a demand that never relaxes, and a supply from abroad that continually increases—so much, indeed, that our egg-merchants look upon the home source as a mere trifle in the scale in satisfying the wants of their customers. We have no accounts of the numbers brought to the markets of Leadenhall and Newgate, and only the rough estimate of a French authority, who gives the value of the poultry of the United Kingdom at less than one year's supply of eggs from abroad. Thus the annual import of eggs from the Continent averaged 73,000,000 from 1843 to 1847; it averaged 103,000,000 during the next five years, 147,000,000 for the next five years, and 163,000,000 for the next five years. In 1861 we received from abroad 203,313,360; in 1864, 335,298,240; and, in 1866, 438,878,880, being in excess of one million a day, and valued at 1,097,197*l.* sterling.

At the present time, although there is much attention devoted

o the subject, it is principally confined to the fanciers, and upon he best description of birds, so that poultry and their product, he egg, have not gained any general popularity amongst persons engaged in agriculture. Whether this arises from a disbelief in the profitableness of the occupation, or the difference between the tenure of the soil in England and that of France, from whence we derive our great supply, is a matter beyond our purpose to attempt any elucidation. . . . . It is evident that more than one million sterling in value of eggs were landed on our shores that could have been raised with the greatest ease at home; and the question naturally arises, "How do foreigners thus take possession of our own markets, with all the disadvantage of having to convey a perishable cargo through the hands of shippers and commission agents, with all the risks and attendant expenses?" There has been no want of inducement in the matter of prices, as in the year 1854 the Custom House computed the real value of eggs as low as 4*s.* 6*d.* per ten dozen; but during the last six years 6*s.* per 120 has been reckoned, which is also the wholesale price in France. Amongst the arrangements under the French treaty was the abolition of the duty charged on eggs. On August 8, 1854, there was a reduction to 4*d.* per 120, and from that time to March 6, 1860, they were entered by the cubic foot at the rate of 8*d.* This mode was found less convenient, and the previous system was adopted, that of number, called great hundreds, or 120, as a unit; and eggs were placed amongst free articles.

The countries from which we derive our principal supplies will be seen by the following Table, with the exception of the year 1866, where the total alone has yet been ascertained:—

From	1862.	1863.	1864.	1865.	1866.
	gt. hds.	gt. hds.	gt. hds.	gt. hds.	gt. hds.
Hamburgh ..	6,864	3,066	3,813	5,670	..
Bremen	15,433	10,250	3,413	1,881	..
Holland	3,801	1,363	1,206	1,772	..
Belgium	169,462	158,526	217,067	171,855	..
France	1,501,402	1,872,753	2,393,521	2,795,899	..
Portugal	13,813	4,251	6,232	1,712	..
Spain	139,628	78,828	54,465	31,328	..
Channel Islands	85,226	99,487	113,294	21,617	..
Other countries	381	900	1,141	1,710	..
Total ..	1,936,010	2,224,414	2,794,152	3,033,444	3,657,324
Value ..	£593,813	£673,638	£835,028	£928,247	£1,097,197

In the volume of trade and navigation published by the Board of Trade, the average prices given for the computed value in the year 1865 were: Belgian 6*s.* 2*d.*, France 5*s.* 11*d.*, the Channel

Islands (their own produce) 5*s.* 10*d.*, and Spanish 6*s.* 3*d.* per great hundred. It would, however, be an erroneous impression to suppose that Belgian eggs were therefore worth more than French, the mode adopted by the authorities at the Custom House being this, to take the average prices published in the 'Economist' for that year as follows, per 120:—

	s.	*d.*		*s.*	*d.*
January	7	6	July	5	9
February	7	4½	August	5	7
March	5	9	September	5	6¾
April	5	7½	October	6	9¾
May	5	4⅛	November	7	8½
June	5	3	December	8	7

and apply the same price to the imports of each month from all parts. The average price so applied varies from month to month, as will appear from the above quotations. Since the value attached to the importations for the entire year is the sum of the values of each month, it follows that the average value of the importations for the year varies for the several countries according to the month or months in which the bulk of those importations took place. The cargoes are shipped chiefly in steam-vessels, and arrive at the ports of Southampton, London, Folkstone, Arundel, Newhaven, and Shoreham. The supplies from Ireland, in the absence of any positive data, are generally supposed to have diminished.

The time for laying eggs takes place according to the temperature and the climate. They begin in France and in most parts of Europe from January to March, the former hens laying in the earlier months, and the sluggish not until the latter. For purposes of preservation the late eggs are considered the best. April, May, and June are the months when the production is most abundant; but in July the laying slackens, to resume a certain degree of fresh activity in August and September. In October and November, which is the season of the moult, it ceases almost wholly, and is null in the month of December. To obtain eggs in this season artificial means are employed by raising the temperature of the houses, and some poulterers assert that a supply can be had in the winter by feeding the birds on buck-wheat, which is then given whole, and upon meat. In parts of France where breeding is carried on as a trade, there is a separate class of persons called *coupeurs*, or hatchers. The hen is seldom allowed to lead the chickens after being hatched; the *coupeurs* entrust this office either to capons or turkeys, the hen being more valuable for laying eggs than rearing the brood. If a similar attention to the details were given in this country, the stock of fowls which roam about the farmyard, and gather corn

ı the threshing, instead of being a mere adjunct and perqui- of the servants, would return sufficient to discharge the rental nany a small occupation. Such, we have understood, has ı the case where the experiment has been fairly tried, and ɜ this becomes an established notion our home supplies will ease in a greater ratio than they do at present. According competent authority, at this time, what with improved native imported varieties, we possess the best stock of egg-layers, ;hers, and table-fowls in the world. In no country is the ıagement of our best poultry-yards excelled. These should e as a model for the rest; and, to bring up the wholesale ılts to their true national importance, all we require is an ex- ıion of the taste for bird-farming amongst those who earn their ng on the land.

'o show the seasons in which the laying is most active, and variations that take place, we give the following figures from import tables:—

	1864.	1865.	1866.
	Number.	Number.	Number.
ıary	6,999,000	13,301,000	16,386,000
ruary	17,851,000	22,323,000	25,794,000
ch	31,849,000	32,231,000	46,537,000
il	42,650,000	39,966,000	51,471,000
r	39,930,000	49,507,000	56,767,000
e	33,177,000	37,890,000	52,334,000
r	35,332,000	38,488,000	36,476,000
ust	34,549,000	34,279,000	40,566,000
ember	29,711,000	28,444,000	33,916,000
›ber	19,547,000	24,056,000	26,917,000
ember	15,864,000	20,424,000	20,696,000
ember	27,836,000	23,103,000	31,018,000

'he increasing demand for eggs, although it has failed to it any corresponding or commensurate efforts in our own ntry, has not been lost upon our quick-witted and versatile ;hbours across the Channel. The metropolis is almost ›lly supplied from foreign sources, and new-laid eggs, as ; are called, demand exorbitant prices, and only reach the es of the well-to-do classes. Those who have the good une to accept the hospitalities of the farmhouse, in addition he never-failing appetite on such occasions, will discover the eriority in this portion of the fare, and will gladly return ı a contribution from the henhouse. The provincial towns, ı trifling exceptions, monopolise the eggs from the sur- ıding neighbourhoods; the small farmers who do not sit the ket sell their supply to the country shopkeepers, or give

them in exchange for other articles. Many cottagers contrive to keep a few fowls, and where there is no pig these act as scavengers, consuming the scraps of the family, the outside cabbage-leaves, peelings off boiled potatoes, &c., and if supplied with a little corn, lay a great many eggs. There are no regular agents or dealers engaged in the trade, but the grocer or the butcher of the village takes the surplus at the usual market price, deducting his commission. The consumption of an ordinary household in the country is as much as 2000 eggs per annum, so that the residue has no great effect upon the metropolis, or the large manufacturing towns. Indeed, it is but too probable that the care of poultry has retrograded; for as the small holdings have been absorbed by large farms, many an active, frugal housewife has been withdrawn from rural life who had the will and the means of supplying the market. Neither the cottager with his allotment (instead of his share in the village green or common) nor the artizan has range enough for producing eggs to advantage; therefore, in catering for the public, the wholesale merchant must occasionally pay a personal visit to the markets in France, and rely upon the foresight and activity of agents to meet the wants of his trade.

Many have entertained a belief in the existence of gigantic establishments, which, from assertions made in the public papers, and the largeness of the imports, found ready credence: but we believe that throughout France there are none more extensive than our own at Bromley. The egg business is almost exclusively confined to small farmers, by whom it is carried on in a vigorous and commercial manner, more especially in the provinces of Burgundy, Normandy, and Picardy. According to the latest agricultural returns furnished by the French Government, for 43 departments, the value of eggs and feathers produced each year was taken at 32,500,000 francs. This was considered to be much under the mark, as the consumption of Paris alone is equivalent to 12,000,000 francs; and although, per head, it would be less in the provinces than at Paris, it may be fairly set at rather more than half as great. The eggs, which at Paris are worth 60 francs per 1000, average 40 francs per 1000 in the country. We thus obtain a total of 100,000,000 francs, or, with the export, 142,000,000 francs (5,680,000*l.*), as the annual value of French eggs. At this rate the consumption amounts to 2*s.* per head of the whole population. One of the French writers on this subject gives 7,000,000 eggs as the annual produce; and if we average 60 eggs as the number that each hen would lay, there would be at least 117,000,000 fowls, and these, at 2 francs apiece, would give 14,625,000*l.* sterling as the [illegible] poultry stock of France. For the past year, on

the same ratio of 60 per head, the eggs imported into this country represent the laying of no less than 7,300,000 eggs.

From a pamphlet published by M. de la Fosse at Goussainville, near Houdan, we select a few statistics of the trade in that immediate neighbourhood, which will give a correct idea of its importance. At the markets of Houdan, Dreux, and Nogent le Roi, there are sold annually upwards of 6,000,000 head of fat poultry, viz. :—

	Per Week.	Per Month.	Per Year.
Houdan	40,000	160,000	1,920,000
Dreux	50,000	200,000	2,400,000
Nogent le Roi	35,000	140,000	1,680,000
Total	..	..	6,000,000

This does not include the sale of chickens, poultry, and eggs, which forms a separate trade. Every village, says an eye-witness, has its weekly markets, where farmers and their wives bring their produce for sale, in preference to selling at the farm-yard. The police regulations in the markets are strictly enforced. The various products are classified before the market begins. Each person is bound to keep his assigned place, and not allowed even to uncover his goods, much less to sell, before the bell rings, under the fine of 5 francs. At the ringing of the bell, the bustle to uncover, the rush of buyers, and the chattering, are worth while to witness. The dealers and merchants take up their stand outside the market, where they send all the products they purchase. The seller has a ticket given him, with the purchase price on it, and is paid on delivery of the goods at the dealer's stand. It seems almost incredible that even in some village markets, within two hours, such a vast amount of business can be transacted, with the greatest order and decorum. Some merchants will purchase from 2000 to 3000 lbs. of butter; others 20,000 to 30,000 eggs, or 1000 heads of poultry, &c., all of which are taken to their warehouse to be sorted, packed, and perhaps forwarded the same day to London or Paris. The current price for every commodity is fixed and known immediately after the market opens, and depends entirely on the demand and supply. At the wholesale poultry market, La Vallée, in Paris, where the poultry, dead or alive, is forwarded from all parts of France, there are a number of licensed agents, who sell by auction to the highest bidder; this market is a curious scene from four till nine in the morning, when thousands

of crates of all descriptions of poultry are cleared out and disposed of.

The eggs are sold in the markets of Paris in baskets, which ought to contain 1040 good valuable eggs. These are counted, at the wish of the buyer, by the official agent, who verifies the *déchet*, or loss; also the size, by passing them through a ring. For such there are charges from 25 cents per *mil* for counting, 60 cents per *mil* for examination, and 15 cents for passing the ring; besides these charges there are the duties collected by the Municipality of Paris. The production of eggs in France is, to a certain point, unlimited; and the attention of breeders has been drawn to the improvement of the breed by foreign additions, and modes of preservation also, for long voyages. In consequence of the success which had attended the exhibition of the poultry of La Bresse (in Burgundy), a stir was created, and on the representations made to him, the Minister of Agriculture instituted a special show for fat poultry at Paris. The fowls were distributed into five classes—La Bresse, Houdan, La Flèche, Normandy, and all other breeds. La Bresse kept the lead, gaining, after a struggle with La Flèche, the gold medal for the best fowls of any class. Much of this success was due to the strenuous exertions of Count Le Hon, as no region had greater difficulties to surmount than La Bresse, which constitutes the arrondissement of Bourg, in the department of Ain, and extends from the banks of the Saône eastward to the spurs of the Jura. The fowls have certain features to distinguish them, and the hen begins to lay in February, and for a month or six weeks lays daily, then three or four times a week, till she has laid about 160 eggs, besides rearing two or three broods. On every farm poultry is fattened to a certain extent, and until lately was little known or appreciated at Paris, though for 40 years it has been exported to St. Petersburg.

The prices of eggs per 1000 have been at different periods as follows in the Paris market:—

	Francs.		Francs.
1804	48·00	1850	43·79
1826	64·50	1852	45·32
1845	48·74	1853	50·19
1846	50·27	1866	60·00

And the consumption had risen from 74,000,000 in 1807, to 174,000,000 in 1853. These are collected from 10 or 12 departments which encircle the city, but more than half is furnished by Le Calvados, L'Orne, and the Somme. From the latter and the Pas de Calais are derived the English supplies. [illegible] Houdan are the villages of Goussainville, of St. Lubin, [illegible] day. Near La Flèche and Mans are Villaine and Boce;

some hamlets near St. Pierre Dive, Lisieux, Calvados, and ıvais in the Somme—all localities abounding in poultry ports at which the greatest amount of activity takes place Calais, Cherbourg, and Honfleur; at Calais the eggs are ted in cases with straw, 1100 to the case; and at Cherbourg Honfleur in cases of 600 and 1200.

he total value of exported eggs, of which England received lion's share, has been as follows:—

		Francs.
1815 to 1835, an average of	.. ..	2,786,000
For 1850	„	7,512,000
„ 1858	„	10,418,000
„ 1859	„	11,340,000
„ 1861	„	17,845,000
„ 1864	„	27,974,000
„ 1865	„	37,650,000
„ 1866	„	42,334,000

r these exports have been distributed will appear by this :—

	1864.	1865.	1866.
	Kilog.	Kilog.	Kilog.
ıum	46,364	84,107	130,627
ed Kingdom	22,095,262	29,765,361	33,458,539
ıany	15,767	35,713	
ı..	34,789	52,632	
.. ..	14,799	16,117	278,659
erland	143,200	133,753	
d States	2,156	3,370	
r countries	27,120	29,719	
Total	22,379,457	30,120,772	33,867,825

s a general definition, the districts that grow buckwheat luce the greatest abundance of eggs; and if we would prose- this matter successfully at home, it would be well to ascer- whether buckwheat cannot be imported to any considerable nt at a cheap rate. Upon the quality and description of egg-laying much depends.

rom a review of these facts, it will be apparent how much neighbours, the French, have accomplished; an export of million sterling per annum in eggs is no insignificant item in the balance-sheet of a nation.—*Abridged from 'The er.'*

10.—*On the Rearing and Management of Poultry on an ordinary Farm.* By Mrs. F. Somerville.*

Introduction.

It is the writer's aim to make this Essay as plain and as brief as is possible when details are given, that it may be suitable to the requirements of a servant, or any one desirous to obtain a practical knowledge on the management of poultry; since it is the fruit of long and careful experience, gained by daily practice, it is not too much to hope that the same happy results that attended the labours of the writer may also requite those who may feel disposed to follow the advice herein laid down.

It is intended to point out the best system with regard to the breeding, rearing, and general management of poultry, more than to dwell upon and describe minutely the different breeds of which so many works now treat.

There are few creatures that conduce more to man's comfort than domestic poultry, whether he be in health or sickness; and, considering how interesting and profitable is the occupation, it is astonishing how few young people there are who make poultry their study, or even bestow upon it the attention it would so well repay. What a lesson of industry, vigilance, patience, perseverance, care, and affection, may be learned from the parent hen, that "gathereth her chickens under her wings"!

General Remarks.

There is no doubt that poultry may be kept and managed so as to produce a profit on all farms where corn and potatoes, or even swede turnips are grown, as the light or inferior grain cannot be sent to market in a more profitable shape than as well-fed poultry; but, like all other farming stock, it requires constant care and attention; and if you expect a full remuneration for your trouble, you must adopt a good system of management, and see that it is properly carried out in all points, from first to last. I do not think it would pay upon a small farm to keep a regular paid attendant; that occupation must be united with other employment, unless it is managed as a business, and first class poultry is bred and kept for exhibition, so that fancy prices can be obtained. Any sharp lad can, under proper directions and occasional supervision, look after and feed adult poultry, but to breed and rear successfully requires some experience. One would not think of trusting sitting birds or their young to

* [illegible] from the Journal of the Royal Agricultural Society.

youth; they require watching closely to keep the different broods steadily thriving; any check at this stage is a wasteful loss of time, and invites disease, whereas prevention is more important and more easily attainable than cure. The coops and sitting-house should be near the homestead, so that the farmer's wife, daughter, or at all events a confidential servant, may, without much loss of time, attend to those two principal points, thus getting a nice change from the sameness of indoor occupation.

Common Fowls.

Breeding.—Where there is defect, there is commonly a cause which may be traced out; and such is the case with breeding poultry. One of the greatest hindrances to rearing is unskilful breeding. How frequently do we hear of large numbers of the young dying without any apparent cause; but I generally find on inquiry into such cases that they have been bred from old birds and without an infusion of fresh blood in the stock for years; or that pullets' eggs have been set; in which case, should there be chickens, they are weak and delicate, and seldom attain perfection.

I keep five pure breeds of the common fowls, viz.:—Grey Dorking, Brahmapootra, Game, Spanish, and Moonies, and breed all the year round. For stock fowls I select the very best birds of the different breeds and mate them according to age, and with due regard to consanguinity: that is, of the same age, if two years old; or hens one year old, and cocks two; or vice versa; taking care that they are not too near akin, and that fresh blood be introduced, on one side at least, every two years, and never allowing more than five hens to one cock. My early and late chickens for table purposes are bred from the Grey Dorking hen by a Game cock, and the Brahmapootra hen by a Dorking cock, mated as aforesaid, which two crosses will answer the most sanguine expectations—the Brahma and Dorking especially—and those who do not care to keep a pure breed or wish to exhibit, cannot, I believe, select more valuable fowls: they are not to be excelled as parents, layers, or sitters: their eggs are large, and the birds very good for the table. I have not the least difficulty in rearing chickens from any of the above-named breeds, and feel convinced that success depends upon the breeding and feeding.

I find that the cross-breds stand the winter months better than the pure breds, and therefore prefer the former to the latter, because of the high prices they will command at that season of the year. The question is often asked, What kind of fowls will pay the best to keep? The answer depends entirely upon the purpose for which they are chiefly kept. If for laying, I prefer

the Moonies, having had pullets of that breed which have laid for twelve months, not missing more than two days a week. They are a good-sized fowl, and are handsome withal; but as table fowls, I should make choice of the Dorking or Game, or the cross-breeds, before alluded to.

The Hatching or Sitting House.—To some persons it would appear quite absurd to think of setting hens where they have not been accustomed to lay: but "where there's a will there's a way." The sitting-house is really a most important apartment, necessary to ensure the successful hatching of poultry; for how frequently do we see hens spoil their eggs by forsaking the nest when they are allowed to sit where they are hourly interrupted, and perhaps driven off their nests by other hens wishing to lay. To prevent all this, a separate apartment is required for sitting hens. It should be divided into compartments, of sufficient size to contain a nest for one hen, and so arranged that the hen can be secured on the nest by a lattice-door, allowing plenty of air; or the following plan may be adopted. The nests (14 inches wide, 14 inches high, and 16 inches from front to back) may range in two tiers along the lower part of a house (8 or 10 feet by 6), each nest being provided with a loose wooden door, reaching within 3 inches of the top, so as to admit of ventilation at the same time that the hen is secured on the nest; the door when closed is fitted into a groove at one end and fastened with a wooden button at the other; each button fastens two doors, and each door is numbered with paint, the corresponding number being painted on the *facia* of each nest.

I never set less than three hens at one time, and that number may always be had broody in the course of a week or ten days by leaving a few spoilt eggs in the nests where the hens you wish to set are accustomed to lay. The broody hens should be managed thus:—During the day make as many nests as you require in the sitting-house, with clean, soft, bruised straw, underneath which, during the summer months only, place a green sod; when evening arrives place the broody hens thereon, and put under each hen three or four trial eggs (which should be kept for the purpose marked with ink), taking care to handle the hens dextrously, placing one hand underneath the breast, holding the legs in the other hand and carrying them upright; otherwise have a convenient basket for the purpose. Feed the newly-set hens as usual with the others, and in all probability at the end of two days they will have taken to the nests; in which case, when off feeding, on the third morning, place the eggs for sitting under each hen, and label each nest, naming the kind of eggs and date when set. On the evening of the eighth day after [illegible] lighted candle and holding the eggs up to the

light, observe if they appear quite clear; if so, they are sterile or addle, for the eggs containing birds will appear opaque. It may happen, should there be many addle eggs, that two of the hens will sit the remaining eggs of the three; and one can be again set, with fresh eggs as before, and so on during the year. The sterile eggs should be marked as trial or nest eggs, or boiled as food for chickens, so that none need be wasted. As each sitting hen is now secured upon her nest, as many only at a time as may be most convenient can be let off to feed, which should be done early every morning inside the sitting-house with closed door, allowing them to remain off the nests fifteen or twenty minutes, and taking care that each hen returns to the proper nest. Give water, with grain in its natural state, but not with soft food. During the summer months, or dry windy March, and about a week previous to hatching, take a little warm water, and, when the hens are off their nests, sprinkle the eggs therewith: this will greatly assist nature in the process of hatching, as the eggs are often very dry in hot weather: this, as a rule, applies to all kinds of poultry.

Feeding.—It is neither necessary nor desirable to go into the market for expensive feeding stuffs; still, there are several kinds of food not grown upon the farm, which yet are cheap and useful in the rearing of young poultry, or putting in condition birds intended for exhibition. One of the cheapest of these, if properly prepared, is rice, it can be bought at 1½*d.* per lb., or even less; preference should be given to the small grain, or fine rice, which should be prepared in the following manner, viz.:—to 6 quarts of boiling water, add 2 lbs. of rice, and let boil for 10 or 15 minutes, according to the size of the grain, when sufficiently boiled, pour it into a hair sieve, and when cold, mix with as much oats or barley-meal, as will, when stirred lightly round with the hand, give it the appearance of small, well-dusted pills; each grain being then separate, it will be very convenient for, and is greedily devoured by young birds, and being very digestible, is an invaluable food for them.

Another kind of food for young birds is prepared by boiling two or three eggs until quite hard, afterwards chop fine, adding two or three handfuls of stale bread-crumbs; mix well together, so that the one cannot be eaten without the other. This may be thought expensive food, but as the consumption by young birds is at first very small, I always consider a little extra keep is not thrown away on them; you are forcing and growing birds that will repay you for all, and at no distant date.

Another description of food is Indian and barley-meal, in equal quantities, slaked with boiling water or milk, and served cold; it cannot be surpassed as food for small chickens, and answers

admirably, given alternately with the rice and egg prepared as aforesaid. The youngest chickens I keep near the house, and feed very sparingly every two hours throughout the day, giving little or no water, as I find over-drinking spoils the appetite and brings on indigestion, which generally terminates in death. As they grow and become strong, they should by degrees be put upon the same food as adults, and any that promise to make prize birds are then transported to a run specially kept for the purpose, to which of course a little extra feed is carried.

The adult poultry I feed twice a day with light wheat, oats, or barley, given alternately with boiled potatoes, or turnips mashed up with ground oats or barleymeal, and I will guarantee this feed to keep them in good condition, and to produce plenty of eggs. Care should be taken in not supplying more food than is eaten, otherwise much may be wasted as is often the case, and I think if profit be looked for, more poultry should not be kept than can be conveniently and well cared for and fed with the produce of the farm, except as I have before mentioned, in reference to young birds or those intended for exhibition.

Turkeys

are not so troublesome and difficult to rear as is generally supposed, and taking into consideration the present prices, it is a question if any of our domestic poultry are more profitable; it is not uncommon for a pair of turkey hens to rear thirty young ones during the season, which at an average price of 12*s.* each, are worth 18*l.*

There are several varieties, the two most useful and profitable being the Norfolk, or black, and the Cambridge, of metallic hue; in size and beauty the latter is pre-eminent. Never keep either male or female for breeding purposes beyond four years, neither depend entirely upon year-old birds; on a farm of ordinary size three hens and one cock will be found a sufficient number with other poultry. Take care to introduce fresh blood in your stock occasionally from the best birds you can procure, and it is a wise precaution to keep on a young cock and a couple of hens as late into the season as may be convenient, for fear of loss or accident to your stock birds. Turkeys should be provided with an apartment to themselves, with perches, and fitted up on the ground-floor, with separate nests, so that each bird when sitting may be secured on her nest, otherwise on hearing the young at the [illegible] hatching, they are apt to leave their own nests and interrupt each other, perhaps leaving some of the eggs to perish. As the laying season approaches place clean straw in their nests, [illegible] encouraging them to lay at home, as they

are often inclined to lay astray, to the great danger of losing their eggs; if the hen be seen seeking a nest, confine her in the place in which you wish her to lay; where the first egg is dropt there will she lay the remainder.

If fed alike they will generally all be broody at or near the same time, should this not be the case the first broody hen must be detained, until the others are ready (that is, supposing you wish to have a second flock, as hereafter described), then place a green sod at the bottom of each nest, with plenty of clean, short straw thereon, and allow the hens a day or two to form and take to their nests. The time of incubation is four weeks, and the hen will sit seventeen of her own eggs, if it is not intended to add a few common hen eggs, at the expiration of the first week's sitting, which is often done, with a view to the chickens encouraging the young turkeys to feed at the first onset. The sitting hens will require food and water daily, for which purpose they should be allowed to come out of doors, as they will not remain off their nests for a long time, but it should be observed that they return to their proper nests; about a week before hatching sprinkle the eggs with warm water, as directed in page 6, and on the actual arrival of that eventful period, ascertain by feeling under the hen whether the eggs are chipping or any birds out; if so, after taking out the shells, if any, leave her undisturbed for the day. It sometimes happens that an egg being slightly damaged, it is requisite that a portion of the shell should be very carefully removed, to allow the escape of the little prisoner, which otherwise might perish. With these exceptions, the turkey, like all other birds, is best left alone. The birds being now all hatched, allow them to remain about a day and a night with the mother in the nest, and on the following morning, weather permitting, place the hen under a roomy coop, with boarded bottom, and selecting a dry and sheltered spot, turn out the young birds in front thereof, feeding them whilst small every two hours with a little hard-boiled egg, alternately with rice, &c., as mentioned in pages 219, 220, not forgetting to give the mother a substantial meal; after which she will soon gather the little ones under her wings. Should the weather be wet and cold, they must be kept under cover, and if confined beyond a week, a few onions, chives, dandelion, or dock-leaves must be chopped up and given with the egg; but this is not necessary when the mother and young can have their full liberty in about a week after hatching, in which case they will select their own vegetables and forage for themselves better than they can be fed by hand. Give water in dry weather after the young are a week old, but until they are three-weeks old do not allow

it to remain by them after feeding. As they become strong feed four times, and by degrees come to three times a day with corn in the grain or other food. It is a critical time for young turkeys when the fleshy tubercles begin to appear on the head, generally termed striking the red, the birds being then about the size of a pigeon. The surest safe-guard is regular and wholesome food. I have known them to perish in a thunder-storm; to avoid this, a temporary shed should be erected at the spot to which you wish them to resort, near which they should be regularly fed, and water placed for them to drink, it is astonishing how quickly they will then seek its shelter on the approach of a storm. If turkeys be fed as herein advised, they will be found in sufficient condition for the market, without confining them for the purpose of fattening, as is often done.

I do not think it is desirable to aim at rearing two flocks in one year, but rather to use your best endeavours to raise one first-rate flock, the hens will then be in better condition for early work the following spring. The second hatch is generally very delicate, and subject to great mortality if the weather is at all unfavourable; however, in some establishments it is almost imperative to have a supply of late hatched turkeys during Lent, and after the game season is over, in which case, and when the first flock is hatched, confine one hen (giving the whole of the young to the others) in a coop or other convenient place for several days, feeding her well; afterwards set her at liberty, allowing the cock to accompany her, she will soon commence to lay again, and probably have her second flock hatched, and the birds will have attained strength ere the wet and cold weather sets in. They nearly always lay twice, and sometimes thrice during the season, and the desire to sit is very great; but by confining them a short time and feeding them well, you may easily put them off, without resorting to the uncouth way of plunging in cold water as practised by some persons.

There is no doubt that the rearing of turkeys is highly remu-nerative, and could be profitably extended if circumstances per-mitted; but if the corn-fields and mowing-grass are near the homestead, I should not advise keeping too many, as a difficulty may be experienced in preventing their doing considerable damage to such crops, unless there be a conveniently situated pasture-field or plantation to which they could be taught to resort. Lastly (though not least) take them to the best market, and do not allow the dealers the profit, to which you are so justly entitled, but sell by weight alive; good birds will command a good price, which at the present time (February, 1867) is from 10*d.* to 1*s.* [illegible] At Christmas last I sold a young cock turkey

for 19*s.* 2*d.*, being 23 lbs. weight at 10*d.* per lb.; the rest of the flock weighed, cocks 18 lbs. or 19 lbs., and hens 10 lbs. or 11 lbs.

GEESE.

Geese, like turkeys, are one of our largest edible birds, and second to none in value, considering the very little trouble they give from first to last, their usefulness upon the table, and the luxurious down and feathers which they supply; but a good sized pond, with a plentiful supply of water and good pasturage, are indispensable to make geese-keeping a paying business, for they are very large consumers.

The Toulouse are the largest breed; and as size is an object in the goose, care should be taken to select fine birds; this breed seldom attains full maturity for breeding until three or even four years old. Let them have an outhouse to themselves, regularly supplied with clean straw, with which make nests, on the floor, as the laying season approaches, and partition the nests off, according to the number required. One gander will be sufficient for three or four geese. When arrived at maturity, they generally lay about twelve eggs each, which number they will sit. The eggs, for safety, should be collected daily and placed in bran, with the narrow end downwards, until the geese, by remaining on their nests, show their desire for sitting; the eggs must then be placed under them, and the house so arranged that they can have free liberty of egress and ingress at all times of the day, as they will require food and water daily, to which they will help themselves, if a pasture-field and pond of water be near, and afterwards return to their nests; little attention is therefore required whilst they are sitting, beyond keeping their nests undisturbed and protected from vermin. When, after four weeks, the time of hatching has arrived, in case any young birds are out, see that all shells are removed, for fear they may cap the other eggs, and thereby prevent their hatching. Allow the goslings to remain in the nest for a day and night, they will not require feeding during that time, but will gather strength; and if the following morning be fine and sunshiny they can be moved at once upon a grass plot or other convenient place, where they will be safe, and supplied with an abundance of nice young grass, of which they will soon partake (this, their natural food, suits them much better than to be crammed with oatmeal pellets), not forgetting to place them some water in a shallow vessel, with which a little oatmeal may be mixed. If the weather is unfavourable, they must be confined in an outhouse, and plentifully supplied with nice green grass turfs and water. The pellets alluded to are made of oatmeal,

formed into paste with cold water, and of convenient size to be swallowed by the goslings; five or six are given at one feed for each bird; but to cram fifty goslings three times a day for a fortnight will be found a long and tedious job, and in most farmhouses time cannot be afforded for the purpose, besides, it is really not requisite.

The most critical time for young geese is about Midsummer; if it is very dry weather, and the pasturage and water not plentiful, it is then desirable to give them a few oats night and morning to assist nature over this peculiar juncture, and help them on until the stubbles are ready for them, and when those are cleared they will be in nice condition for fattening, which is best done by making them up, in lots of ten or fifteen in number, according to the size of the place, supplying them with plenty of water and an unlimited quantity of oats for three weeks, giving them a clean bed of straw when required; they will then be ready for the market. The day previous to killing turn them on the pond for the purpose of washing their feathers, and supply a bed of clean straw in the feeding-house before their return; but take away all food and water, and let them fast until killed the next day, when they must be dressed for the market. The price of the bird in December, 1866, was, in some places, from 10*d.* to 1*s.* per lb., small feathers 2*s.* 6*d.*, and the down 7*s.* 6*d.* per lb. It is unwise to sell green geese, on account of the loss in the feathers as well as the carcase, unless a fancy price is obtained for all together, but do not sell by weight at an ordinary price. There is not the slightest doubt geese pay well where there are proper conveniences for keeping them, but they must be well managed and kept out of the mowing-grass and corn-fields, or they will soon do damage to the amount of double their profit.

Ducks.

There are many varieties of ducks, but the two most profitable and best suited to the farmer generally are the Aylesbury, or white duck, with flesh-coloured bill, and the Rouen, which should be exactly like the mallard in feather, though much larger in size. Both kinds are equally good, and gain great weight if properly bred and fed, and well supplied with water; they will weigh 16 or 17 lbs. per couple at 8 months old. In breeding for the market, ducks are best hatched under a common hen, and kept off the pond, they thrive better without access thereto, and are fit for the table at 8 weeks old; but those intended for store should have plenty of water, and be provided with a house, furnished occasionally with straw, and nests pre- [illegible] and if regularly fed they will become attached to their

abode; otherwise they are apt to ramble, especially if there is a brook near, in which case many eggs are lost. They commence to lay early in the spring if well fed, and, if not allowed to sit, continue to lay until autumn. It is very desirable to have a good supply of early and late broods, which always fetch a high price. There is very little trouble in rearing ducks, whether the eggs are set under the common hen as before mentioned, or under the duck; the time of incubation is one month. Let the ducklings when hatched have a good nesting for about twenty-four hours, afterwards clip off the down at the tail to prevent their being drabbled, then place them with the mother in a coop, and feed with coarse barley-meal, to which water is added, making the food quite sloppy; afterwards give Indian meal and bran mixed up with buttermilk, so as to form a proper consistency, occasionally adding a few boiled potatoes by way of a change; and, as I have before stated, they will be ready for the market in 8 weeks, which is the chief end to aim at, and get them into money as soon as possible. Early ducklings are generally sent to the market in the feathers, but if kept over 2 months old, it is better to dress them, on account of the feathers, which are nearly, if not quite as valuable as those of the goose; and the duck, when dressed, is more convenient to the buyer, consequently, will command a better price.

In a work of this kind it would be quite useless to enter into a description of the many existing varieties of fancy ducks, which are of no value to the generality of farmers, or where mixed poultry is kept, on account of the additional convenience, care, and attention required.

Guinea Fowls

are a useful and handsome bird, and are in season during the months of February, March, and April; they lay a great quantity of eggs during the summer, but, being of a wild nature, they generally lay astray, consequently their eggs are sometimes lost. Their flesh is of very gamelike flavour, and, coming in after the game-season, they are useful for the table; their eggs are small, but fine flavoured, and always worth the same price as common hen-eggs, the price of the birds being generally about 7*s.* 6*d.* per couple. It is the best way, in case of breeding, to set the eggs under the common hen, the time of incubation being one month. After hatching place the hen under a coop, around which fix a guard to prevent the young straying, as they are very wild; they may have the same food as young turkeys (see p. 221). The coop, which should have a boarded bottom, will require to be moved to fresh ground every other day at least; after the

first week the young birds should be shut up within the coop, to avoid injury whilst being removed; they may have their liberty when three weeks old, but the mother should be kept in the coop a week longer. The young will by degrees become tame and good foragers, and little difficulty will be experienced in rearing them under this method; but they are troublesome amongst other poultry, being regular attendants, however well fed, at the chickens' coops, besides being very quarrelsome, often driving the most spirited cocks before them, and perhaps injuring them in some way. From these remarks it may be inferred, according to circumstances, whether it is desirable to keep them, or not, upon an ordinary farm. I have made 8*l.* within a little, from one pair of birds during a season. As many males as females are required, as they always pair; the spotted variety is the hardest, the white are very delicate birds.

Pigeons.

There being so little trouble with these birds, it is desirable to keep a few at most places; they are always readily sold, and are in great demand when game is out of season and spring chickens are scarce. For breeding purposes they should not be kept too old; a convenient way of denoting their age is to cut off a nail of the claw every year, and a good cote with separate nests should be provided, and kept scrupulously clean, and a plentiful supply of rock-salt afforded. For the table and profit, the Blue Rocks are preferable to most other breeds; one pair will produce ten hatches during the year. Feed regularly, but scantily, as they will find the greatest portion of their own food.

Eggs.

Eggs should be gathered daily, in fact whenever they are to be found, for fear of loss or accident; those from the select poultry should be placed in bran, with the narrow end downwards, marking thereon the date, as the preference is always given to the freshest eggs for setting, though they will keep good for three weeks, and if you have more than required they may be sold at a good price. But ordinary eggs should be sold only when dear, and preserved when cheap, in the following manner:—if there are many, procure a tub that will contain, say 40 gallons, which place in a cellar or other cool room, and put therein one bushel of quicklime, 2 lbs. of common salt, and ½ lb. of cream of tartar, then add 30 gallons of cold water, and stir round a few times to mix the ingredients; afterwards leave until the following morning, when again stir up all well together. It should

hen be of such a consistency that an egg will float on the surface. Another vessel of convenient size must now be provided, in which the eggs are to be preserved, packing them close together with narrow end downwards (which should be done daily, after a commencement is made, as the fresher the eggs are the better), adding as much of the prepared liquor as will just cover the eggs; this must be done day by day until the vessel is filled within three inches of the top, then fill up the vessel with the liquor, and in a few days a crust of icelike appearance will be formed over the vessel, so as to keep it perfectly air-tight. Eggs (if fresh) preserved thus will keep as long as required, and for all cooking purposes will answer as well as the freshest, from which they can scarcely be distinguished. Having practised the system for years, I will guarantee it to have the desired effect, if properly carried out. Where labour is a consideration, eggs may be managed so as to pay better than rearing young fowls, as far less time and attention is required with laying hens; but the non-sitting varieties should generally be kept, though sitters will be required to produce early chickens, which must furnish the fresh eggs for the breakfast-table during the winter-months.

Conclusion.

No given rule can be laid down as regards the keeping and profitable extension of poultry on an ordinary farm, as so much depends entirely upon the conveniences and attendance—whether the latter can be performed by a member of the farmer's own family, whose time is not otherwise profitably employed, or whether it can be had at a reasonable rate; if not, a large number will have to be kept to produce a profit, after paying for special attendance; but if poultry of all descriptions are kept in large numbers on too small a space, the ground becomes tainted, and disease and death make their appearance amongst them. Poultry in some hands flourish and pay wonderfully well, whilst in others it is just the reverse; all depends upon the care, skill, and attention bestowed in the management thereof.

For the satisfaction of the reader I will state the produce and value for one year of my poultry, as regards the female stock managed as herein stated. In some instances fancy prices were obtained, and prizes taken on exhibition, which, of course, are included in the value. No account of the quantity of food consumed was taken, as I had no intention of offering a statement to the public. It was, however, all grown on the farm, except about 4*l.* worth.

104 hens produced 13,739 eggs, exclusive of those set; they

reared 372 chickens, besides hatching the ducks and guinea-fowls.

5 turkey hens reared 74 young.

6 geese reared 58 goslings.

Ducks hatched under hens: 79.

Guinea-fowls hatched under hens: 42. Reared and sold.

Attendance: a boy and myself.

Total value of the above, 190*l.* 17*s.* 8*d.*

N.B.—7 store ducks kept; the guinea-fowls were the produce of one pair.

Manor Farm, Rufford, Ollerton.

11.—*Danish Dairy Management.*

EQUIVALENTS OF DANISH WEIGHTS AND MEASURES REFERRED TO.

Square mile is nearly	=	22·	square miles (English)
Tönde (metrical)	=	3·8272	bushels ,,
,, (superficial)	=	1·363	acres ,,
Foot (fod)	=	1·0298	feet ,,
Inch	=	1·0298	inch ,,
Pound	=	1·1024	lbs. ,,
Pot (fluid)	=	1·1758	quarts ,,
Rigs-daler (96 skillings)	=	2·243	shillings ,,
Rigs-daler per Tönde-land	=	1·6456	shillings per acre ,,

IN regard to the quality of their dairy stock generally, I think that in all probability it would be improved by a judicious introduction of some of our blood—Shorthorn, Ayrshire, or Jersey. In the management of all their leading dairies the old arbitrary "rule of thumb," which still holds sway over too many of ours, has entirely disappeared, and a philosophic treatment, based on sound scientific principes, is the rule and not the exception. The experiments quoted testify to its advantages. The dairy now, instead of, as of yore, being the abode of ignorance, and often too of superstition, is the centre of an enlightened and regular manufacture, where certainty replaces chance, and where the waywardness of the dairymaid is checked and controlled by the daily account she has to give of the produce committed to her, while her skill and attention are encouraged by the registered returns. When Mr. Friis showed me his "Dairy Register Sheet," I expressed my fears that any attempt to introduce such an elaborate system of analysis into the dairy farms of this country would have a very serious mental effect upon our dairymaids, which would at once stop our proceedings.

He replied, that on first showing it to his own head dairymaid she burst into tears, and continued in a very distressed state of mind for a full week afterwards. As she regained her composure a few figures were seen chalked on the board; these rapidly increased, until they reached the last column, when she acknowledged freely the value of the daily details, which testified to her own skill while recording her dairy returns, and declared that she would never take the management of any other dairy unless she had the comfort and protection of a similar arrangement. From that day the success of Messrs. Friis and Segelcke's "Dairy Register" was assured, and it is now finding its way into all the best dairies of the country. In our ordinary manufacturing establishments, even where there are none of those elements of disturbance which always exist more or less where primary organic substances are manipulated, as in butter and cheese making, such analyses of results are sought for and valued. Would it not be well, then, for us to introduce them (in modified form, perhaps, suited to our different requirements) into our own dairies,* where too commonly practices are quite independent of principles, where figures are eschewed, and the "reign of law" all but unknown.

The farm establishments of the larger proprietors form quite little colonies in themselves. The dwelling-house is necessarily of capacious size, and is replete with every comfort and convenience; while the same roof shelters not only the master and his family, but also his numerous dairy and farm dependents. The single men live in the house, the married have cottages at the homestead, and in most cases have certain daily rations of food allowed to them. Those who live in the house have meat four days in the week, and about 1 lb. of butter and 1 lb. of cheese per week each. Beer is given at the rate of about 150 gallons per head per annum. The annual cost per head depends mainly upon the housekeeper, and ranges generally between 100 and 120 r. d. per annum. In addition to their keep they receive from 60 to 70 r. d. for their labour. The head dairymaids live in the house, and receive from 120 to 150 r. d. a year; they are allowed also to take one or more pupils, according to the size of the dairy, with each of whom they receive a fee of 20 r. d., which is paid by the Royal Agricultural Society. These pupils superintend the milking, and take part in all the dairy manipulations. The milking, cleaning, and general labour of the dairy is done by a staff of women helpers, at the rate of one for each

* The reader will do well to consult the article "On Dairy Statistics," by Mr. John Thornhill Harrison, in vol. xii. of the "Bath and West of England Society's Journal."—Ed.

20 cows in milk. The cows are kept for the six winter months in the byres, and for the rest of the year (May to October) in the field. The general practice is to picket them singly over the field, shifting them from three to six times each day, as the keep may render necessary, and leading them to water twice or thrice a day. On some farms, as at Ourupgaard, they are kept picketed until September, and then allowed to run loose; but very rarely indeed is the practice which I saw at Gjeddesdals followed, of allowing them to wander over the pastures and graze at will; and yet that would appear the more rational treatment, as a forced exposure to the sun and blasts of a variable climate, without shelter or the means of protection from insect annoyances, must, more or less, affect an animal's comfort, if not its health, and thus disturb its natural secretions. In either case, whether picketed or loose, they are always attended by the herdsman, who has the entire charge of them.

The cows are milked for about ten months after calving; the milking takes place twice a-day, at about 4·30 A.M. and 4·30 P.M. The calves are sold, as soon as dropped, at an average price of 2 r. d. each; a few of the best bred being retained to keep up the stock. In the winter the milk is allowed to stand from 24 to 26 hours; it is then skimmed, and the butter made from the cream. In the summer, the milk is churned fresh, and always gives a better return both in regard to quantity and flavour of butter than when made from cream. It is usually tubbed at from 18 to 24 hours after it is made. Cheese is made from both the skimmed and the churned milk, the refuse portions being conveyed to the hog-pens. It is generally made twice a day in summer, and once in winter; and in winter both the cheese and the butter are coloured with annatto. The cream or milk for churning is generally set at 56° to 57° Fahrenheit in summer, and at 61° to 62° Fahrenheit in winter; the increase in temperature during the operation is about 4° in summer, and from 2° to 3° in the winter.

The quality as well as the quantity of the milk is a matter of consideration to the farmer. In Mr. Tesdorpf's returns is shown the practical bearing of the latter in the classification of the cows according to their respective yields. The tabulated returns of the Lillerup and Ourupgaard dairies during a continuous period of 26 months show the variation in the quality of the milk at different periods of the year, and also the proportion of milk required for each pound of butter produced.

Until within the last few years, the dairy management in Denmark was much the same as it existed a century ago. The whole subject, however, in its theoretic as well as practical bear-

ings, has recently been submitted to the test of experimental inquiry, which has rescued it to a great extent from the darkness and uncertainty attending its operations. Foremost in this good service were Mr. Friis and Mr. Segelcke—the former testing and proving practically at Lillerup the value of the principles laid down and explained by his friend and fellow-worker. Thanks to these enlightened men, the thermometer has now the post of honour assigned to it in the dairy, for the dairy farmer knows well the important bearing it has upon his breeches' pocket. In a pamphlet recently published by Mr. Segelcke,* on the Theory and Practice of Husbandry, it is shown that—

1. The quantity of butter obtained by churning is dependent on the temperatures used.
2. The temperature that gives the best result differs according to the quality of the cream (more or less old).
3. At any temperature, higher or lower, the proportion of butter obtained is diminished.
4. A considerable percentage of butter, which otherwise might be obtained, is lost when the churning is not so regulated. This loss may often be very large, as a difference of only 2° Fahr. may result in a loss equal to 4 per cent.; whereas where the thermometer is not regularly used, the temperatures frequently vary to the extent of several degrees.

The quality is also directly affected by the temperature at which the cream or milk is set, and its increase during the operation of churning.

The following results of experiments carried out at Lillerup show practically the bearing that attention to temperature has upon the produce obtained. (See table next page.)

The results of each of these four double trials showed that a less proportion of butter was produced from the milk or cream when the temperature at the end of the churning was 63° than when it was 60½°; thus the difference of a single degree (Reaumur) † was sufficient to affect the butter yield to the amount of from 4 to 5 per cent.

The average produce of butter obtained may be taken at 1 lb. of butter to about 30 lb. of milk. In dairies such as those of Lillerup, Gjeddesdals, and Ourupgaard, and others under like management, the proportion is more satisfactory.

The importance of duly registering the daily produce of the

* Meddelelfer vedrörende Meierivösenet, &c. Kjöbenhaven, 1865.

† The temperatures are all registered in Denmark according to the Réaumur scale, which bears the proportion of 4 to 9 to Fahrenheit, between the freezing and boiling points.

dairy, and thus establishing a system of comparison and checks in each department, was too obvious to need much persuasion to ensure its adoption as soon as a form of register was devised that should comprise all the points on which information was desired.

INFLUENCE OF TEMPERATURE ON CHURNING (LILLERUP).

Sets of Double Experiments.	Temperature in Degrees Fahrenheit, at		Quantity Churned in Pounds.		Butter produced in Pounds.	For 1 lb. of Butter there was required		Time occupied in Churning.	Therefore, 1 lb. of Cream gave the same Result as 5½ lbs. of Sweet Milk.*	
	Commencement.	End.	Milk.	Cream.		Milk.	Cream.		Sweet Milk used to 1 lb. of Butter.	Percentage proportion of Butter obtained.
								Min.		
1	55¾	60½	284·90	35·10	22	12·95	1·60	105	21·75	100
	60½	63	306·72	37·28	22	13·94	1·69	43	23·24	93·6
2	56¾	60½	333·36	31·37	24½	13·20	1·28	105	20·24	100
	60½	63	321·59	31·18	23½	13·68	1·33	39	21·00	96·4
3	56	60½	343·17	22·36	21¼	16·15	1·05	104	21·92	100
	60½	63	347·32	22·63	21	16·54	1·08	68	22·48	97·5
4	56½	60½	340·94	22·53	20¾	16·43	1·09	113	22·42	100
	60½	63	340·56	22·47	20	17·03	1·12	45	23·19	96·7

The dairy working arrangements are generally good. The churns are necessarily of large capacities, generally in wood, and worked either by horse or steam power. At Valbygaard, near Slagelse, a new dairy has recently been erected, in which the shallow rectangular pans or trays in enamelled iron, that received so much notice at the Exhibition of 1862, are used to contain the milk. There are 48 of these pans, each 9 × 3 feet, arranged in six rows of 8 each. The cream was readily and rapidly removed from the surface by means of a light wooden rake carried upon two small wheels, which, travelling on the parallel side edges of the pans or trays, enable the rake to sweep over their entire surface. The dip of the rake into the pan was regulated by a simple mode of adjustment. When the cream was all removed the end of the trays was slightly tilted, so as to discharge the

* This proportion is the mean of a series of trials that were undertaken at the same time as the churning experiments.

skimmed milk into an open trough at the other end, which conveyed it direct to the cheese-tubs, whence it passed out in the shape of whey to the piggeries. The dairy herd on the farm consisted of 170 cows.

A comparison between the dairy management and produce of our country with that of Denmark would be valuable to both countries, if the data of both were equally reliable. But, unfortunately, this could not be ensured, as, with a few exceptions, we are not in possession of any dairy statistics that we could offer for comparison, and those even are too limited in their details to justify a verdict on either side. The following returns from our own dairy records, however, may interest the Danish farmers, and perhaps induce a more general attention to selection and care in breeding, as adopted by Mr. Tesdorpf, and perhaps also the introduction of foreign blood, possessing milking properties, to cross with the best of their own. These returns are, no doubt, to be relied upon as far as they go; still they must be only taken for what they are worth—the milk-produce of certain dairies on a comparatively limited scale.

Our principal dairy breeds are the Ayrshire, the Channel Islands, the Shorthorn, the Suffolk, and the Kerry. Some published returns of two dairies of Ayrshire cows give the annual milk-produce per cow at 650 and 632 gallons respectively. Three returns of dairies, consisting wholly of Shorthorns, show a produce of 540 gallons, 630 gallons, and 765 gallons respectively, or an average of 625 gallons per annum for each cow. In two dairies, where half-bred Shorthorns were kept, the yield was 810 and 866 gallons respectively for each cow. In four dairies in Ireland, where pure Kerrys and crosses with Shorthorns and Ayrshires were kept, the annual produce per cow was returned at 500 gallons, 600 gallons, 675 gallons, and 740 gallons respectively; or an average, on the four dairies, of 630 gallons per annum for each cow. A dairy of "pure Kerrys" * gave an average of 488 gallons per cow, and another of the larger Irish breed gave an average of 583 gallons per head per annum. In the great London dairies, now well-nigh extinguished by the ravages of the cattle-disease, these returns are greatly exceeded. The cows kept are large-framed Shorthorns and Yorkshire crosses, which, by good feeding, bring the returns to nearly 1000 gallons per annum for each cow kept. The custom in these establishments is to dispose of a cow directly her milk falls below 2 gallons a day, and buy another in her place.

The following milk return of one of our best managed dairy-farms (Frocester Court) shows the relative produce of cows in

* A remarkably small native Irish breed.

the successive years of their milking. The first lot were bought in at 2 years old; all the others at 3 years:—

No. of Cows.	Year of Milk.	Produce per Head.
8	1st	317 galls.
15	1st	472 „
14	2nd	535 „
15	3rd	616 „
20	4th	665 „
18	5th	635 „
9	6th	708 „
15	Old	651 „

The maximum reliable milk produce that we have recorded was that of a single cow belonging to the keeper of the gaol at Lewes, the details of which were authenticated by the Board of Agriculture. In eight consecutive years she gave 9720 gallons, or at the rate of more than 1210 gallons per annum. In one year she milked 328 days, and gave 1230 gallons, which yielded 540 lb. of butter, or at the rate of 1 lb. of butter to 22¾ lb. of milk. In the early part of the present year (1866) a return was published of the produce of a cow in a Vermont (U. S.) dairy, which was stated to have given, in the previous year, a butter yield of 504 lb., at the rate of 1 lb. of butter to 20 lb. of milk.

Quite recently, too, our agricultural journals have recorded the butter produce of an Ayrshire cow at 339½ lb. in the 10 months between calving (March 10th, 1866, and January 10th, 1867), besides supplying the family with milk and cream; and of another cow of the same breed which has supplied the owner's family with milk and cream, and given for the past three years, 1864-5-6, respectively, 269 lb., 282½ lb., and 275½ lb. of butter.

The proportion of butter varies with the season and with the breed of the dairy cows. The milk of the Ayrshire cow is generally richer in butter than that of the Shorthorn or Suffolk; but this again is not so rich as that of the Kerry or Channel Islands breed. As a rule, it has been found that the best returns have been obtained in the later summer or early autumn months, when we have returns of 1 lb. of butter to 20 lb. of milk (Ayrshire breed; 1 to 19 (breed not stated); 1 to 19½ (Irish breed; to 18½ (Ayrshire); 1 to 17½ (Ayrshire); 1 to 16½ (pure Kerry); and even 1 to 16 (Shorthorn). This latter, no doubt, was under exceptional conditions. In all probability the average butter [illegible] of our dairies is about 1 in 30, ranging between 25 to [illegible] lb. of milk to 1 lb. of butter.—*Professor John Wilson's Official [illegible] to the Agricultural Exhibition at Aarhuus*

12.—*A New System of Haymaking, with Remarks on the Culture of Grass.* By ALEX. FORSYTH.

IT is easy enough, as the old adage hath it, to "make your hay while the sun shines," and I have nothing to offer that can supersede the bright sunshine for haymaking; but when clouds have obscured the sun for many days and rain has fallen I can still save the crop, as this system works best when there is moisture in the grass, and I should have no more difficulty in drying the herbage in March or September than at Midsummer. In drying the leaves of the tea-plant it is very questionable whether the grower would ever get his tea into marketable condition by any system of air-drying such as we practice for hay. In drying medicinal herbs and pot-herbs, which is only haymaking on a small scale, it is no easy matter to preserve the medicinal qualities of the herbs for distillation and the colour of the pot-herbs; and in this matter we have the evidence of the Chinese, as well as that of our own experience, that drying them in the sun is not the best way to accomplish these ends. Herbs dried in the shade and by artificial heat are superior to sun-dried herbs, and although meadow-grass, with all its mixture of field-herbs, may be sun-dried in the field and afterwards fermented in the haystack, so as to smell quite sweet as hay after the genuine orthodox system of haymaking as by use and wont established, it could not compare in flavour with tea-leaves artificially dried as the teas of commerce are dried by the Chinese, nor with camomile flowers white as snow, done by the herbalist, nor with parsley, green and full-flavoured, done by the housekeeper; all of which had been done hastily, and by artificial means, as one would dry linen before a fire or else on a kiln, as one would parch corn. In the case of haymaking in our day, hands can hardly be got to do it as formerly, and this difficulty is likely to increase; and moreover hay will not pay for making at high wages, therefore the mowing-machine must be used to save the costly scythe-labour, just as the threshing-machine has been used to supersede the flail: and means must needs be devised to dry hay by artificial means in this uncertain climate of ours, instead of helplessly looking on until we see the half-dried herbage rot in the haycocks. In the Exhibition of 1851 there was to be seen a coffee-drying machine; it looked like a chest of drawers, and the wet berries were put in the shallow trays or drawers, and each drawer was made to slide on rails, and was run out on castors, so as to look when open like a stair, each tread being a layer of coffee-corns drying; and in case of dew or rain all the drawers could be run into the chest, and were thus for the time housed from wet. The principle is

a good one, and may be used by us as well as by them, for the coffee-planter rejected the foul weather and made the best of the fair weather. It is a well-known fact that wet linen will dry in a thorough draught in a gallery or shed, where air is fully admitted and rain kept out; every postage-stamp and receipt-stamp wetted and put on is a case in point of the action of air-drying: all the paste used in paper-hanging is air-dried; it has simply a house over it, and yet every room, passage, and garret gets duly dried in a few days at most. Where yarns are manufactured, and particularly in the bleach-crofts, this air-drying process may be seen going on at any time; but the ugliest sample of drying which manufacturers have to deal with in this country is that of drying bricks so as to get a lump of clay-puddle, hard and dry, ready for baking in the brick-oven or in the clamp. The brick-moulder has been taught by experience that if he leaves his batch of wet clay exposed to the air it will assuredly very soon get dry on the surface, hence we see it carefully covered over with matting to keep the air from it. If we take a week of changeable weather at any time, we shall find that three-fourths of it has been such that a lump of wet clay or a web of wet linen would have dried very considerably—the clay having been in an open shed, and the linen hanging on a line under cover—even although rain had been falling for three days out of the seven. The bleacher and the brickmaker are necessarily well versed in the power of air-drying, and, next to seafaring men, may be said to have "their weather eye open." If bricks had to be wholly dried, as they are first laid flat on the ground like hay, the risk of their being damaged by rain would be greater than it is now, and the cost would be increased by the extra space and time required; but when bricks are just hard enough to be built up into low open walls and roofed over, the brickmaker considers them nearly out of danger from wet. There really appears to be no end to the millions upon millions of tons of clay-puddle that have been air-dried and that are now being air-dried into bricks ready for burning, and yet, with the exception of frosty weather, we never hear at any other time of a brickmaker that could not dry his bricks. Therefore let no one despair, for if the greater evil has been already got over, and clay-puddle has been air-dried, hay can be air-dried also; but for this end we must borrow, as I am doing now, ideas from mechanism applied to other manufactures already in good working order; and for our encouragement in this line, let us bear in mind that when gardening was enslaved to the scythe, as it has been in my time, and men had to mow very early in the morning, or, to speak more plainly, had to labour a good part of the night in the heat of the grass-growing season to keep the lawn and flower-garden neat (and this under the

ancient pretence—quite true—that the grass cuts best about three or four o'clock in the morning) in due time the machine-maker borrowed the revolving shears from the manufacturer of velvet, and by engrafting that shears upon something like our garden-roller, gardening got the tool that was invented and used to shear velvet to cut grass neatly, and thus do the lawn-mowing, and that not in the morning only, but all day long; and it was not long after this that the reaping-machine came upon the stage. The one-blade system of scythe and sickle, wielded by men, is now on its trial against the two-bladed reaper drawn by horses.

One of the greatest practical difficulties to be encountered with haymaking is its bulky character, and if the bulk could be reduced, that alone would make haymaking much more manageable than it is now. When the Staffordshire potter packs his ware in the crates the straw is laid so evenly, and packed so tightly with the ware, that after all the goods have been got out of the crate it can hardly be made to hold the loose straw that has come out of it, and wagers are said to have been laid by good packers that a countryman could not cram all the loose straw into the crate that had held goods and straw both; but when the latter twisted the straw into ropes it was soon found that they occupied only about one-third of the crate, and so the countryman won the wager.

Now the brick-croft, or rather the tile-croft, is just my idea of what a hay-croft ought to be, and when hay has been spun into ropes and wound upon a bobbin or centre, two rows deep, and the centre has been taken out, it will leave the hay-cylinder with a hole all through like a drain-pipe. I have called the centre-piece a cylinder, but, accurately speaking, it is the frustrum of a cone, with a diameter of 4½ inches at one end and only 4 inches at the other, and when a wall of these hay-cylinders has been set up like a wall of drain-pipes, the first process will be inaugurated, and all the tossings, turnings, and rakings of haymaking will be laid aside, and the open wall of unburnt bricks will be the model to work by, and the pipe-tile will be the pattern of the hollow ware. Hay spins best when damp, for after the grass has fallen from the crisp state it gets tougher than before, as well as more pliable. Flax is wetted in spinning; it is, therefore, nothing new to damp the staple, or to spin it in a damp state. When once hay has been spun, and thus tightly pressed into shape on a bobbin, it has entered upon a new phase in its "making;" reduced in bulk, firm and compact to handle, yet open like a stook to the air, it can now be kiln-dried, if necessary, as well as air-dried. I have elsewhere stated how hay has been kiln-dried by scientific men and ground into meal, and made into biscuits; but for our present purpose we only want it milled, not baked, to enable the farmer to feed stock with it without waste, and to add

water and such seasoning as he sees fit; for although the horse has a mill in his mouth, it is cheaper for the owner to pay for the milling than to employ the mouth of the horse to do it. Buonaparte I. is said to have allowed only twenty minutes for his staff-officers to dine, and Mr. Brassey, the railway contractor,—following, no doubt, such a celebrated leader—allowed the same time to his fine teams of waggon-horses for their midday meal, and they generally finished in the time allotted, and lay down to rest for the remainder of the hour. French etiquette saved the officers' time, as it is the servants that carve in France, and not the gentlemen; and Brassey's horses in like manner had their bait ground or otherwise prepared for them before it got into the manger. The cow and other ruminating animals grind their food wet by chewing the cud, after the fashion that colour-grinders make paint; whereas the horse grinds dry, and his corn gets but one offer, and unless every grain of oats gets crushed by his teeth into meal, it is as good as lost, in proof of which we see the oats germinate after being eaten, and many a lean horse would wear a better coat if the miller were to give him a hand to grind both hay and oats.

Mr. Smee, the celebrated physician, made biscuits of hay bleached, and also of straw, to show what could be done, after the potato failure, with grass as food for man. Should any one be at a loss in learning to spin hay, let him go to the nearest rope-walk and see several people spinning, whilst one turns the wheel for all the rest; and if this does not satisfy him he might look in at the princely establishments in the province of Ulster, where they spin fine linen, and take a lesson there; or if the woollens were more in his way, the Vale of Stroud has the yarn for her broadcloth spun to perfection; and lastly, let him look at the way they do it in Lancashire, for the cotton-lord has taught thousands how to "toil and spin." There is a small tool called a hand-wrench or twister, for making straw-ropes, and whether neat or clumsy, the tool is to be found in some shape at every farmhouse in Aberdeenshire; it is called the thrack-thruck. Now let any one take this hand-gear and make himself a rope of half-dried hay, and wind it two threads deep on a piece of wood, 4 inches in diameter and 18 inches long, and when the wood is removed let this grass-cylinder be suspended in an open shed till it is air-dried, not troubling himself about the consequences, but confining the experiment to the question, can hay be well dried in this way? and when this has has been answered, further issue in the matter can be taken. Fifty blunders in trying would be no evidence of the thing being impracticable. There has always been a link wanting in the chain of haymaking; it never could be piled [illegible] because it was loose nor pressed, and it could

get no help in drying because it was so clumsy you could not house it; it was apparently made to be trampled upon, and when carted and stacked it seemed like some great accumulation of loose litter gathered into an immense cottage-shaped rick, differing only from a dunghill in having something like a roof over it, but in no case giving one the idea that it was worthy of respect as a valuable article of food, to be kept clean and dry.

Unless hay is made up on bobbins, or otherwise twisted and pressed, it cannot be kiln-dried. Hay thus dried is greener and lighter than ordinary hay, and is old hay at once, and all ideas about fermentation are, of course, quite out of the question; it is too dry for that.

The doctrine that horses and cattle are beasts of taste, and that they like their fodder with some flavour, is only of recent promulgation among farmers, as witness the "food for cattle" men "doing the chemistry" with fenugreek and ginger, and charging accordingly. Where tillage with the rotation of crops is practised, and credit taken for good farming, the kind of grass grown for hay is often of the lowest order; I allude to the rye-grass and clover of the Scottish husbandry, the "clover and eaver" of the Devon farmer. Rye-grass, or ray-grass, in all its forms is certainly one of our heaviest grasses, and it is indigenous to the land we live in; it is therefore a free grower, but a coarse plant, and it is just the sort of grass that when dried should certainly have a trifle spent upon it in the way of salt, fenugreek, and ginger. The way that ray-grass is cultivated or grown is such that no fine or tender grass could endure. The seeds of this grass are heavy, and it is therefore easily sowed as compared with the extremely light seeds of some other grasses. When a crop of oats or barley has been sowed, and has begun to braird, the ground is over-sowed with this "clover and eaver" broadcast, much after the fashion, we imagine, that the Arch-Fiend did in the good man's field when he sowed the cockle "while men slept." Where a crop has got well established you cannot grow tender seedlings of the finer grasses by over-sowing, for they can only be grown well where the land is like a flower-garden, and every part of their culture needs the greatest care and nicety. I have often seen costly mixtures of grass seeds sowed, but when I came to look for the plants in the grass field they were not forthcoming; the seeds of the finer grasses are so small in size and light in weight that extraordinary care is needed to sow them and cover them in, for they must neither be buried nor left above ground. And where are the farms—where the lands in spring that could be brought to such a fine tilth as to receive them properly? and how are they to be covered in? and with what? Those who are in the habit of sowing fine seeds in-doors

know what delicate handling they require, yet, notwithstanding all this, if we are to have good hay we must have high quality in the grass; and as all the economical grasses are accurately figured and described in books, there can be no excuse for growing "clover and eaver," as if there were no other kinds of grass in cultivation. I would advise all who are interested in grasses to study well the living specimens to be found in gardens such as the Botanic Garden at Kew, and in their native habitats, hill and dale. Since the era of cheap literature the straw that formerly was so much wasted has found an outlet, and is now sold to the paper-maker, who cuts it and sorts it in such a systematic way that the growers of hay and straw may well take a lesson from him. The straw is digested in a strong alkaline ley to separate its flinty coat from its woody fibre, which latter article is what the paper-maker wants. The vegetable tissue, along with the spent ley, is generally wasted, and, although unquestionable as a manure for grass, yet being so abundant and unmanageable, it froths in torrents, drugging the stream that carries it away.

Besides the botanical character of the grasses to be grown for good haymaking, we must not forget that the welfare of the grass plants will generally depend upon the materials supplied to them, for vegetables must feed upon what is set before them. The caustic alkaline ley above mentioned, when diluted with water until it scarcely tastes soapy, is a cheap and very efficient manure; indeed all the forms of soda sensibly affect grass crops, even when the dose seems quite infinitessimal. Salt is one of the cheapest grass manures, and greatly improves the quality of grass, if I may use the expression, for the table; for the "salt lick" tells truly without speech how cattle long to have their portions seasoned with salt. Sulphuric acid (or oil of vitriol) is perhaps the cheapest stimulant we have for grass, as it has to be diluted with not less than 500 times its weight of water, or 900 times its bulk of water, to make good acid manure water. Wood ashes are nearly as good as guano for grass land, and the ash of the rank bracken fern (*Pteris aquilina*), formerly used as wash balls, is better even than wood ashes. Lime, guano, and bone-dust, are all so well understood in the culture of cereals, that the farmer who would essay to grow barley, for example, without lime, would be black-balled as unworthy of the fraternity to which he belongs. Farm-yard manure and night-soil, or town manure, are staple articles, and need not be named. There is perhaps no greater bubble afloat in the agricultural world now than the value set upon dirty water as manure for grass. Water and manure are both so clearly right for grass that no one [illegible] their efficacy, but every [illegible] will [illegible] manure water; and

when grass has been grown under certain conditions, such as the shade of trees and certain forms of irrigation, although it may be tall and thick—a regular "fill basket"—it is not rich grass. Experienced dairy people can tell what pasture-fields their cows have been in by the flavour and richness of their milk: and this test must ever be respected, as it is the golden one, the ring of the Californian metal that no one dares to despise.

To an ordinary observer the world seems to have been sown with grass from a random mixture of species, but on closer examination we soon see how beautifully Nature has suited the grasses to the sites they occupy. Look, for instance, at the wiry bundles of that storm grass, the common sheep's fescue (*Festuca ovina*) thriving on the bleak hillside in a thin layer of vegetable mould; its hair-like foliage exposes neither length nor breadth to the storm, which from the situation is its "constant and familiar guest." I have no hesitation in saying that this grass does work that no other sort of grass could do better, if so well; and it is by studying grasses where they are at home that we see their true characters and what they are capable of doing for us. The wheat being a true grass and so well known, may be quoted to show the culture of grass; its seeds have been measured, numbered, and weighed, and an acre has been planted with the dibbler with a gallon of wheat, and as the crop has been satisfactory, we have the clearest evidence that the work has been done accurately as to distance between the lines and spaces; but, fortunately, wheat is one of the largest grass seeds we possess.

About 1824 there was growing in the parish of Old Meldrum, on the Meldrum House estate, belonging to James Urquhart, Esq., acres of native and foreign grasses in flat drills, just as the wheat is grown in England. He employed women to weed his Timothy grass and his foxtail grass, &c.; but to sow the light and small seeds, and to cover them in, was the work of his gardeners' men, and it was done neatly; and I cannot see why we should always mix grass seeds. The Scottish squire grew them separately. When I saw them they were luxuriating on land that only a year or two before had been a worthless swamp, and they were sowed after the same fashion that wheat is dibbled: and by this treatment the finest grasses can be successfully cultivated. When the Scottish house-wife coloured her butter, she grated carrots and put the pulp into the churn in a linen bag; but when I wanted yellow butter, I also grated the carrots and gave them to the cow, and the effect produced in both cases as to colour was the same, but the milk as well as the cream and butter in the latter case was greatly improved by the carrots: and I cannot too often repeat that we

must first feed the grass and then feed the beeves with it. How very slowly agricultural intelligence travels even on the best of roads! I recollect perfectly the heaps of dry bones and unburied offal that lay bleaching on the common around our village before we had learned the value of such a manure, for the "Cannie Scot" had pinned his faith to the bulky midden, made up in great part of wet straw, and could not believe in bone-dust at first, and was altogether incredulous as to the use of guano. But a reformation of manners soon set in, and the dry bones disappeared as if by magic from the common, and found graves in the parallels of drill husbandry, or were ground to powder and the treasured dust sowed on the green sward to enrich the grass, which it did most effectually. I may here state that I first became acquainted with grasses sorted and grown separately in my youth. Mr. Urquhart's grass plantations looked quaint, and the names were odd, and many of them then, as well as now, had a tail to them—as cat's-tail grass, mouse-tail grass, fox-tail grass, and dog's-tail grass; and a child must be dull indeed that could forget the quaking grass, with its trembling spikelets, like so many palpitating hearts, or the beautiful feather grass of the gardens, with its silky beard, like the downy plumage of some rare bird.

About 30 years ago I went from London to Bedfordshire, a distance of 40 miles, on foot, to see the grass garden at Woburn Abbey, belonging to his Grace the Duke of Bedford: the grasses were arranged in small squares like a quilted scroll, and each square neatly edged with grass. I have paid many a visit to the long, narrow, neatly-kept beds allotted to the grasses in the Kew Botanic Garden—it is such a treasure to find the specimens accurately named; and speaking from long experience, I wonder at the little interest taken by most of my companions in horticulture in the subject of grasses. I could find plenty of enthusiasts who have scoured the straths of Scotland, the orchards and sea cliffs of Devon, and the wilds of Westmoreland for ferns, when the search seemed very much like a wild goose chase; but with the exception of our leading nurserymen, who deal in grass seeds and grow patches of each kind for trial and experiment, I know of very few people who trouble themselves about the true grasses. Clover, lucerne, sanfoin, and the like, although cultivated either along with grasses or by themselves, as substitutes for grass, have nothing to do with the true grasses, any more than a field of tares grown for fodder should be called grass, or that the poisonous crowfoot should be raised to the same dignity because when it is in flower it makes the meadow shine like a sheet of gold by its [illegible] presence. The system of haymaking and haygrowing, [illegible] over the greater part of the country, seems better

suited to the patriarchal time when they harvested hay and provender for cattle, than to the settled tiller for profit, with all our modern means and appliances. I complain of growing only ray-grass when there are so many other choice sorts in the market. I complain of grass being grown in a slough of dirty water. I complain of slovenly haymaking and the want of resources to do it well, and I complain of good hay being wasted and trodden under foot when it should have been not only gathered into barns duly as cattle food but cut and ground as if it were not only cooked for the cattle but actually chewed for them. When the field is clothed with grass I want to arrest it when it is at the best and bake it hard dry at once. The usual rule is to cut the grass when in flower; this is not a safe rule, for some grasses are past their prime when in flower: the rich flower-stalk of the common cauliflower is quite worthless as food when the plant is in flower; and this clumsy example is clear enough in its way to show what I mean.

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13. *The Weight of Corn.*

THE corn trade of this country is in a state of great confusion. In one place corn is sold by the quarter; in another it is sold by some unit of weight, and in another by some other unit. These units have generally a reference to the weight per bushel. It seems very desirable that a uniform practice should be established throughout the whole kingdom, so that the quotations of prices might become easily intelligible. Except for liquids, the quarter is probably the most indefinite unit in existence. Two quarters of oats may differ from each other to the extent of 10 lb., or 20 lbs., or 40 lb., or 80 lb., or 150 lb. The bushel is a legal measure; but there is no legal or uniform way of filling it. No two meters will put the same weight into it. Half-a-bushel measure, except of particles perfectly fluid, is only half-a-bushel of corn by an unknown and constantly varying method of filling. Neither is a peck the fourth part of a bushel of corn, if both measures are filled in the same way. The reason why it has hitherto seemed desirable to combine measurement with weight in exchanging corn is the assumption that the weight per bushel is an index of the quality of value. In other words, that the heavier the grain is per bushel, it contains proportionally (the proportion unascertained) the more meal. This is one of the bases of the corn trade. If it is true, it is of sufficient importance to warrant a very strenuous endeavour to devise a uniform mode of filling the bushel. The method which, after various trials, the writer has adopted is, to place a flat-bot-

tomed perforated filler one-fourth of an inch above the rim of the bushel or measure, and to stir the corn through the holes, thus filling the measure equally all over, constantly from the same height, and without enclosing masses of air. In general, this method increases the weight above the ordinary basket-filling from three to eight pounds. With certain sorts of oats approaching the Canadian type, successive trials yield very uniform results. But with all rough oats approaching the Tartarian type, the weight generally increases at every successive trial with the same sample. Indeed, to increase the weight of many sorts of oats per bushel, nothing more is necessary than to give the sample to be weighed a good smart whisk in a corn-basket. This friction will rub off a great many of the asperities, and permit the seeds to flow more easily into a compact mass. The weight per bushel will thus increase, while the absolute weight diminishes. Again, the weight of oats per bushel, in all sorts which have awns or long rough hulls, depends, to a considerable extent, on the instrument by which the oats have been threshed. If threshed by the flail, the awns and sharp points will be less broken and hummelled than if threshed by machinery. Whatever hummels the grain most will produce the heaviest bushel, while, of course, extremely little variation will have taken place in the dynamical relation of the kernel and hull. Again, oats which are smooth, well closed, and sharp at the ends, flow closely together, and leave much less space unoccupied than oats which may be better filled and the glumes somewhat open at the upper end. So that the smoother oat will give the heavier bushel. From these considerations a suspicion arises that the weight per bushel is no true test of the comparative value of oats. [Mr. Wilson then read a tabulated statement of six pairs of experiments, and then continued]—In the first pair, black Tartarian and Sheriff, which are different sorts of home oats, the weights per bushel are nearly equal; while the weight of meal per cwt. varies nearly 7¼ lb. In the second pair (both potato), which are the same sort of home oats, the weights of meal are nearly equal, the advantage being in favour of the sample which weighs least by 5¼ lb. The third pair, both sandy, are also samples of the same sort of home oats. No 85, weighing 45 lb. per bushel, contains 86½ lb. of meal, while No. 69, weighing 47¼ lb., contains 83¾ lb. The fourth pair (various and Tam Finlay) compares home with foreign oats. Both samples are nearly of the same weight per bushel, while the one contains more meal than the other to the amount of 7½ lb. per cwt. of grain. In the fifth pair (both various) both samples are foreign. The sample from Sweden weighs 43 lb., and contains 76 lb. of meal per cwt. while that from Archangel weighs 40¾ lb. and

contains 81½ lb. of meal per cwt. The sixth pair (Canadian and Darthonia) are both home oats. In weight per bushel, the Canadian stand at one extreme of the oats scale, and the Darthonia, or bristle-pointed, at the other. The smooth compact Canadian, with a hull like plaster lath, contrived to slide into the bushel to a weight of nearly 54 lb., but gives no more than 77 lb. of kernels to the cwt., while its less accommodating opposite (though deprived of its awns) sticks out its bristles, and demands elbow room in the bushel, and so will permit no more weight there than 34¾ lb. But it far surpasses its rival in the only point which is commercially and agriculturally important—namely, the ratio of kernels to hulls. The qualities are the quotients of the weights of kernels divided by the bushel weight; but the absolute qualities, which are really important, are simply represented by the weight of kernels, the weight per bushel being evidently a thing of no permanent meaning or importance whatever. It appears, therefore, to the writer that a uniform corn trade should be based on a uniform unit of weight, the quality or comparative value to be tested in the manner adopted in these experiments, and that the bushel should be wholly set aside.—*A Paper read before the British Association, by A. S. Wilson.*

14.—*Intensive and Extensive Culture.* By A. De Villiers De Lisle Adam.*

[The following article affords interesting evidence of the mode in which foreigners are feeling their way through steps already familiar to English farmers. Intensive farming apparently means high farming, such as is implied in the breaking up of sheep-walks and the use of artificials in the Channel Islands, whereas extensive farming corresponds to the sheep-walks which were to be found originally in England, and are to be found at the present day in the colonies.]

In reading a paper by M. Lecouteux, upon the Economical Position of Agriculture in 1865 ('Journal d'Agriculture Pratique,' Feb. 5th, 1865), I was struck with the thought that it might discourage many cultivators: a second and more attentive reading only confirmed my first impression, and I therefore now submit my observations to the reader.

The extremely low price of cereals at that time caused much suffering amongst agriculturists, and these sufferings were re-

* Translated from the 'Journal d'Agriculture Pratique' expressly for the Mark Lane Express.'

newed pretty often. One remedy for this position has been pointed out (said M. Lecouteux), and that is *intensive* culture; then, after having said a few words upon the advantages attending that method, he raises great objections without explaining them. I hoped that at the end of the paper I should find some better remedy than intensive culture pointed out, but only encountered the hope of a larger application of public money in the country—a most excellent and desirable thing undoubtedly, but one we shall still have a long time to wait for.

Nevertheless, M. Lecouteux is not an enemy to intensive culture, and certainly had no intention of deterring agrculturists from practising it. His paper, read before the Central Society of Agriculture, is sheltered from all criticism because it aims principally at pointing out the means for favouring agricultural progress; but, presented to the generality of farmers, it might, perhaps, cause uncertainty and discouragement.

"How is it, then," said M. Lecouteux, "that this mode of culture, which appears so advantageous, is not more generally adopted in this country? Can it be that there is land from which a good produce and remunerative price can be obtained from small crops?" It is not to be wondered at, for the great majority of farmers possess neither the knowledge nor capital necessary to practise it, and, above all, to establish it successfully. On the other hand, intensive culture, having for its result, and even for its base, a large increase to the fertility of the soil, could not be adopted by a farmer without his making special agreements with his landlord, very different from the ordinary terms of a lease. The difficulty of regulating these agreements, so as to guard equally the interests of both parties, is one great obstacle to enterprises for improvement through the medium of the farmers. Even the slow progress of agriculture, considered in general, and particularly from the adoption of intensive culture, is in reality a great benefit; for, if agricultural productions could be suddenly increased to a considerable degree, the consumption not being in the same proportion, the result would evidently be a disastrous obstruction.

It must not be inferred from this that it is wrong to plead the cause of progress; the distance to go is so great that progressive agriculturists need not fear that by uniting their efforts they will arrive at their end too quickly.

Can small crops give remunerative produce to agriculture? That depends upon what is understood by the word *remunera-*
[illegible] districts which yield small crops the farmers are poor,
[illegible] accustomed to privation, as M. Lecouteux justly remarked,
[illegible] that the produce they obtain is not remu-

nerative. The emigration from the county to towns is the principal reason why farmers have more trouble and less profit than the artisan, tradesman, or manufacturer.

Agriculture with small crops subsists, and, it is true, can even struggle against intensive culture: but at a distance, and on condition of living on black bread and paying only a small rent. With equal advantages, and on the same land, extensive culture would not support the competition.

Land, capital, and labour are the three essential elements of agricultural produce; but they may be employed in different proportions. Let us look at the influence of these three elements upon the choice made between *extensive* or *intensive* culture. The former employs a great deal of land, small capital, and little labour; it is therefore necessary, first of all, to obtain the land cheap, that it may make up for the scarcity of capital and labour. Intensive culture uses less land, but more capital and labour: the result of which is that it can pay a higher rent and must have abundance of capital, as well as hand-labour at a moderate rate. It demands, besides, an advantageous market for it animal produce. I am therefore led to the conclusion that *etensive* culture is suitable for countries where land is of little value, capital rare, and the population small, as is the case in new colonies; whilst *intensive* culture can only be practised in rich, thickly-populated countries, where there is plenty of capital, hand-labour, and good markets.

M. Lecouteux says land is rented at 2½ per cent., whilst money is lent to agriculture at the rate of 6 or 7 per cent.; and from that he seems to conclude that land is cheaper than capital. I do not myself concur in this opinion.

The capitalist who purchases a property consents to place his money at 2½ or 3 per cent. for the sake of the security of the investment, and the continual increase in the value of land: the price of a domain often rises according to its appearance or convenience. Now, the farmer has nothing to do with these considerations: he cannot, and ought not to, pay more than its agricultural value—that is to say, the advantage which he procures from the possession of the land. The rate of sale is partly ruled by its tenantable value, but the rent is never ruled by the price of sale or venal value of the estate.

The amount of rent is established by competition; but it may differ from the true agricultural value, based upon the fertility of the soil and commercial situation of the domain. Land is cheap when the rent is decidedly below its agricultural value: land at a *low price* and *cheap* land are two essentially different things.

The rate of capital is the same all over France. Labour

varies in different localities, but is much less than might be supposed; the true price of labour is not the mere day-wages of a man, nor the annual cost of a farm-servant: it is the quantity of work executed for a certain sum of money. Now it happens in some localities, where food is coarse and wages low, that labour in reality is dearer than it appears to be, from want of energy and from the slowness of the labourers.

In the present state of circumstances, with the price of land, capital, labour, and agricultural produce such as it is now, which is most advantageous—*intensive* or *extensive* culture? That question can only be solved by an examination of facts.

M. Lecouteux states that our cattle-market is good, because foreigners delight in contributing to it: that is essential. But, on the other hand, I see that in countries where *extensive* culture is adopted the farmers are poor, badly clothed, and ill-fed; whilst in parts where *intensive* culture is practised they are well off; even sometimes rich, well-dressed, and well-fed. The results might appear to be the effect of local circumstances; but the success obtained in all the departments by intensive culture, at the time of the meeting for the prize of honour, proves that there is nothing in it. I therefore feel justified in concluding that *intensive* culture gives far more advantageous results than *extensive;* nevertheless the latter subsists, and will continue for a long time yet—until, in fact, intensive culture comes into close competition with it.

I do not mean to say that intensive culture is to be recommended everywhere, and always without rule or measure; for it exists in many degrees, and may be practised under different forms. It is not indissolubly bound to permanent *stabulation*, weeded crops, and yields of from 30 to 40 hectolitres per hectare. All culture which tends to raise a soil to the highest degree of fertility in the shortest possible time should be considered *intensive.*

In a poor soil it is generally a great mistake to introduce weeded crops and permanent *stabulation* all at once: in that case *intensive* culture would not be incompatible with the fallow and pasturage, at least at first; and it would be well under most circumstances for some years to practise the mode of culture recommended by M. Lecouteux, under the title of *mixed system,* to confine the extent cultivated to just so much as can be well manured, and to take the rest of the land in pasturage, reducing it little by little in proportion as the production of manure will permit.

To conclude, the true resource of agriculture now is, in *intensive* culture and in the predominance of fodder produce. Let us endeavour to produce abundance of fodder and the best market

possible; then, by using them well and choosing them wisely, they will be found most advantageous; the outlet for our animal produce will never fail us; and by means of copious manurings we shall obtain the highest returns, which alone can give large profits.

15.—*Cheese-making in Small Dairies.* By JOSEPH HARDING, Marksbury.

AN opinion prevails among small dairy farmers that they have not equal advantages with those who have larger dairies, and who make thick cheese, because they cannot so profitably convert their milk into marketable produce. Hence various methods of dairy practice are resorted to; calves are fattened throughout the year, or butter and skim cheese are made; and sometimes butter is made and the skimmed milk given to the pigs.

The former of these methods is quite as objectionable as the practice of selling milk, since nothing is left for the pig, and consequently there is little or no manure for the land.

The latter practice involves a positive waste, as the milk could be turned to a more profitable account, and the pig be otherwise fattened at a smaller cost.

Milk is the dairy farmer's source of income; it is, therefore, to his interest to be conversant with and to employ that method which will yield him the most profitable return. It may be useful if I give my own experience in determining this point. Some years ago I experimented with equal quantities of milk upon the three usual methods employed in dairy practice; viz. (1), making skimmed cheese and butter; (2) half-skimmed cheese and butter; and (3) whole milk cheese. The following are the particulars and the results:—

1st.—*Skimmed.*

		£.	s.	d.	£.	s.	d.	Price per Gallon for Milk.
50 gallons of milk produced	Butter, 12 lbs., at 1*s.* ..	0	12	0				
	Cheese, 35 „ at 4*d.* ..	0	11	8				
					1	3	8 ..	5¾*d.*

2nd.—*Night's Milk Skimmed.*

		£.	s.	d.	£.	s.	d.	Price per Gallon for Milk.
50 gallons of milk produced	Butter, 5½ lbs., at 1*s.* ..	0	5	6				
	Cheese, 41 „ at 6½*d.* ..	1	2	2½				
	Whey butter, 4 ozs., at 10*d.*	0	0	2½				
					1	7	11 ..	6½*d.*

3rd.—*Whole Milk.*

		£.	s.	d.	£.	s.	d.	Price per Gallon for Milk.
50 gallons of milk produced	Cheese, 46½ lbs., at 7½*d.*	1	9	0¾				
	Whey butter, 12 ozs., at 10*d.*	0	0	7½				
					1	9	8¼ ..	7*d.*

The results of these experiments shew that the highest price per gallon for the milk was realised by converting it into full milk cheese; the next by partly skimming the milk and making both butter and cheese; and the lowest by skimming all the milk and then making cheese from it. Were these experiments repeated at the present time there is little doubt but that, owing to the increasing demand for fine cheese and the limited consumption of that made from skimmed milk, the balance would be still greater in favour of making full milk cheese.

The most profitable method of converting milk into marketable produce having thus been determined to be by making full milk cheese, the next point to be considered is, what size and shape of cheese are best suited to the public taste? It is a mistake to make full milk curd into a flat, thin cheese. However good it may be, it is only in exceptional cases that a first-class price can be obtained, simply because the shape is not commendable. In a dairy of 20 cows and upwards a thick, handsome cheese can be made, and, if good, will realise the highest price; but, as this cannot be done in small dairies, the best shape to be adopted is the truckle or loaf. Thousands of cheese of this form are made in the rich marsh lands of Somerset and some parts of Wilts; but though the form of these cheese commends itself to our notice for imitation, the character and quality must be avoided, or the object of the cheesemaker will be defeated. If a better class cheese be not made than is usually exposed for sale at the Highbridge and Chippenham markets, it would be more profitable to adopt the plan No. 2 in the above Table, as involving less loss; but there is no reason why the *finest* cheese may not be made in small dairies. The inferior character of the loaf cheese above referred to is due partly to the manner of making, but chiefly to the want of a proper understanding of the nature and state of the milk and curd during the process. As to the method employed, perhaps there is none better than that of the improved Chedder, as being systematic, simple, and successful. The making the loaf cheese may involve an additional amount of labour and some waste; but if *well* made, so as to be rich, mellow, and fine in flavour, such cheese are always in request, and will realise 5*s.* per cwt. beyond the cheese made in larger dairies, as small families will readily pay more for convenience of size and presentability of appearance. The best kind of vat is the expanding staved vat, either with or without a bottom, as the cheese can be much more easily liberated from them than from those of ordinary construction, whilst at the same time the edges of the cheese are less liable to damage. All the vats should be of equal size, and furnished with neide followers made to fit nicely. The

cheese may be pressed in tiers of threes or fours, as required; if turned twice a day, two days' pressing will be sufficient. The edges should be well bandaged whilst in the press, to secure them against damage. There may not be sufficient curd to fill each vat every day, but if salted, and pressed by the hand into a vessel, and the vessel covered, the curd will keep till the morrow, when the cheese may be made up with new curd. No anatto should be used or the colour of the curd of the two days may not correspond. It frequently happens that these small cheeses are not quite as solid as those of a larger size. Cavities will occasionally appear, unlike a naturally heaving cheese, but as though a portion of air had been suddenly arrested and confined. This, I believe, arises from too sudden pressure upon so small a surface, and should be remedied by a gradual addition of power to the press. With ordinary treatment in the cheese room, these small cheeses will be equal in quality, flavour, and appearance, to Cheddar cheese of any size, and will give the small dairy farmer corresponding advantages to those of the larger dairy farmer. The approved size of the Cheddar truckle is about 10 in. deep by 7 in. wide, and the weight from 10 lbs. to 13 lbs. each.

16.—*Arterial Drainage and Outfalls.* By Richard B. Grantham.

As far as I am aware the subject of arterial drainage and outfalls has not yet obtained that notice which a question of such very great national importance and professional interest to the engineer is entitled to. I therefore beg permission to offer a few remarks upon the subject, as I have taken special interest in it, and am in a position to promote the adoption of a system hereafter described, which must prove beneficial to those who will avail themselves of it.

This matter refers simply to the improvement by deepening, widening, and straightening of rivers and the prevention of floods in districts under their influence, especially where underground pipe drainage and open ditches have been so extensively carried out as to inundate valley lands by overcharging the rivers, this evil being considerably on the increase as these improvements are made.

For many years past the difficulties in the way of improving rivers, so as to increase their discharge, have been so numerous as to totally put a stop to any attempt at producing a better state

of things. The difficulties were these: persons owning lands on the course of a river, who might be desirous of reclaiming them from floods, could be entirely prevented from so doing by the opposition of a single owner of even a small piece of land, either by prohibiting any one from cutting a channel for the river through his property or not allowing it to be diverted, or by mulcting in heavy damages those who flooded his lands by improving their own. In addition to this, there were no provisions by which lands, if it was possible to improve them, could be taxed in an equitable manner, so that they should be rated in proportion to the benefit conferred upon them, or for the recovery of the rates. The only means of instituting a definite power for these purposes were resorting to Parliament in every special case, although in many instances the area being small, and the expenditure on works probably light, the area would be incapable of bearing the great additional cost of an Act.

It should be understood that I refer chiefly to the dealing with tributary rivers and streams in agricultural districts; and the most suitable cases are those which intersect wide flat valleys, these valleys being always the most injured by floods. The treatment of large rivers, such as the main arteries of the country, by deepening and straightening them, is far too extensive a question to be taken into consideration at present, although much good might be done in preventing floods and more efficiently draining the lands dependent upon them; but, besides the magnitude and cost of the necessary works, there are numerous complicated interests, such as navigations, fisheries, &c., which render the subject much too difficult to be dealt with.

The well-known Act of 23 Henry VIII., cap. 5, which constituted the present commissions of sewers, was the nearest approach to the formation of drainage districts; but its jurisdiction does not extend beyond the limits of the flowing or level of the tide, and is only operative on sea-boards and tidal rivers. There are at present in sixteen counties thirty-four commissions in existence; some are effectively and usefully worked, others are of scarcely any value, and none have power to raise money to execute extensive works, or to extend their areas of jurisdiction so as to include upland rivers. The commissions, which they hold from the crown, have no longer duration than ten years when they are renewable, and they consequently cannot raise money beneficially for so short a period.

In 1861, the Land Drainage Act was passed, and it has since been put into operation. In the first part of this Act, the Act of 23 Henry VIII., above referred to, is incorporated and extended, defining the duties of the commissioners, and giving

hem greater power to execute works, raise money, levy rates, and set out boundaries to drainage areas; and there is the same provision for appointing commissioners under the old law.

Part 2 of the Act provides for the appointment of elective drainage boards, which are to be elected yearly, and imply a more popular system than under a Commission of Sewers.

These boards have the same powers, and the jurisdictions are determined in the same manner, as under Part 1 of the Act.

The Act is put into operation, whether for the 1st or 2nd Part being at the option by the owners of land in a valley or marsh district, who present a memorial to the Inclosure Commissioners for England and Wales, who send an inspector to the locality to hold meetings and hear all those who are interested in the matter. He then examines the proposed boundaries, and reports accordingly. Upon the Inclosure Commissioners' approval they report to a Secretary of State, and, under the 1st Part of the Act, a commission of sewers is granted by the Crown, or, under the 2nd Part, the Inclosure Commissioners issue a provisional order, which is confirmed by Parliament.

The average cost of procuring the power of the Act, in either case, has hitherto not exceeded 50*l.*

There have been already twenty districts formed, comprising about 65,000 acres, in the counties of Brecon, Cheshire, Gloucester, Hereford, Merioneth, Norfolk, Northampton, Nottingham, Oxford, Somerset, Worcester, and York. The areas of the districts vary from 600 to 11,000 acres, and in those cases which have been completed, and may be said to form a fair criterion, the rates to liquidate the costs have varied from 4*s.* to 10*s.** per acre annually; and the results have been most satisfactory, in some cases benefiting the lands by as much as 100 per cent. of their former value.

In order to constitute any combined system of arterial drainage, legislative provisions must always form an important consideration, because such can only be carried out by those means which give the majority of landowners the power to determine upon and execute, under certain conditions, such works as may be necessary for the benefit of all whose lands lie within the area, and to tax all in proportion as their lands may be improved.

The national importance of the adoption of such a system may be inferred from what has been already stated respecting the facilities afforded for the improvement, both directly and indirectly, of land, and for making it more productive and valuable.

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* In one of these districts (an area of 2700 acres) the cost will be from 6*s.* to 20*s.* per acre.—J. H. C.

One can scarcely take up a newspaper this season without seeing that if certain lands, mostly of a clayey soil, had been drained, better crops would have been obtained. Mr. Bailey Denton's letter, lately published, relating to Lord St. Germans's estate, gives a good illustration.

The interest attaching to the subject in an engineering point of view is that it affords a wide field of occupation for the profession, and the results to be attained would be commercially profitable, and do great good.

If I may be allowed, I will quote two cases of arterial drainage, the works of which I have recently completed. They are accomplished by different methods, one by gravitation and the other by pumping. The gradients of the bottom of the river in the former case are as follows:

Length.	Gradients.	Width of Bottom.	Slopes.
Chains.		Feet.	Outlet into a tidal river.
40	1 in 586	8	
243	1 „ 3007	8	
36	1 „ 1553	6	1½ to 1
31	1 „ 1300	4	

This work will be extended in the course of time. The part of the river adjoining the tidal river into which it is discharged is embanked on both sides, so that neither the meeting of the up-country water with the tide, nor the tide itself, will for the future cause any flood over the lands. Provision is made to drain off rain and spring water from within the banks, as well as to let flood water in, and keep it there to irrigate the lands, and let it out at pleasure. These are all pasture-lands, and consist of a retentive clay soil. The rates vary from 4*s.* to 10*s.* an acre. The area comprises about 1400 acres, and the catchment basin 123 square miles. The benefits arising from the straightening and deepening have been felt far above the limits of the jurisdiction, by lessening the duration of floods, the new river taking off the water as fast as it descends from the upper country. Cattle were feeding, last autumn, for two months later than they could possibly have done before the river was altered.

The other case to which I refer, that of pumping the area, is a district containing about 1100 acres, and 2500 acres of water-shed. It consists of a marsh, partly of peat and partly of ooze and sand; it is surrounded for one half the distance by a raised stream and a lake, and the other half by sand-hills and high land, yielding a great quantity of water. These arterial drains were

cut, which meet one leading to the pumping-engines. The following are the lengths, gradients, and widths, all having slopes of 1½ to 1, except where the slips have rendered flatter ones necessary.

Length.	Gradient.	Width of Bottom.
Chains.		Feet.
15 (leading to engines)	level	6
41	1 in 2000	4
54	1 „ 2314	4
55	1 „ 2640	4
33	1 „ 2000	3
28	1 „ 2640	3

The pump employed is an Appold's centrifugal, worked by combined low-pressure engines, by Easton, Amos, and Sons. The average lift is 6 ft., and the power 18 horse-power nominal. The depth of cutting in the drains varied from 4 ft. to 8 ft. The greater part of the marsh produced rushes, flags, and water-weeds of all kinds, which are fast disappearing, and good grass coming up in their place. The plough has already been at work, and crops of oats are growing where formerly snipe, geese, and gulls alone were found. It is estimated that the whole 1100 acres will be more than doubled in value, and the rates will not exceed 6*s.* or 7*s.* per acre. The cost has been about 4500*l.*

These two cases, although totally different in their position, mode of treatment, and other circumstances, equally prove to what an extent the country would be benefited were the system which I wish to advocate carried out to a greater extent, and there are thousands of acres of land now useless which would be rendered equally and perhaps more valuable. They also show that a proportionate benefit may be derived from the improvement of small areas, as well as from that of large ones.

Referring again to the legislative powers necessary for the purposes of a combined system of agricultural drainage, it is required that all which are called "sewers laws" should be inquired into and consolidated. Sewers were originally open or closed drains in the country, for taking off flood, rain, and spring waters, and also in towns, where the drains were open and rarely covered; but of late years the term has been employed, almost exclusively, to denote drains for the removal of town sewage; and as this description of drainage has received its due attention from the legislature, agricultural drainage ought also to be put in an equally good position, and should have well-defined laws for its regulation.

I send you* herewith a copy of my paper on the Land Drainage Act, 1861, which was written in 1865, at the request of the council of the Bath and West of England Agricultural Society.

It is intended to amend the Land Drainage Act in the next session of Parliament, to increase its efficiency.

22, *Whitehall-place, S. W., August 29th*, 1867.

17.—*Winter Management of Farm Horses.*

NOTWITHSTANDING the progress which cultivation by steam has made of late years, there is little doubt that for a long time to come horses must continue an important branch of farm live stock; and as it is of the greatest consequence that farm horses shall be at all seasons kept in a proper state for the work they have to do, we believe that a few remarks on the winter treatment of this indispensable class of animals will be of a seasonable nature at the present time.

We must observe, that if we are to judge by the appearance of a large proportion of the farmers' horses which we meet with in town on any market day, it would seem that neither in style nor condition are they suited for the work of the farmer, provided it is done as it should be. Light shambling nags are not exactly the kind to turn up a good broad-shouldered furrow to the action of the winter's frost; nor is their unkempt appearance a proof that their owners take much pride in the way they are turned out for the road. And when we come to examine the stuffy holes in which farm horses are kept, in but too many instances, it is not surprising that they are frequently "touched in the wind," and suffer from other complaints clearly attributable to unhealthy stables. The same laws affect alike the health of "the horse and his master," and that of farm horses as well as of farm labourers would often be much worse than it is, were it not for the large proportion of time spent by each in the open air.

Although the days are comparatively short during winter, yet he work which falls to be performed by the horses of the farm ı by no means of a light description, and as the days lengthen ɔut, the work, as a matter of course, becomes heavier, because it 's of longer continuance. It is essential, therefore, that horses ɔe kept in a condition rather over than under their work; and ve must bear in mind that when once horses have been "let

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* This letter was originally addressed to the editor of 'The Engineer,' and [illegible] appeared in that paper.

down" in condition, it is difficult to bring them up to the mark again.

Hay and oats must always form the main staple of the food of farm horses, but the farmer may be assisted by good fresh oat straw, at least to some extent, while there are other articles, capable of being used as food, which help to restrict the consumption of the latter. Oat straw must be sound and fresh if given to horses; and it is advisable to chaff both it and hay, and also to crush the oats. Chaff cutters and corn bruisers—the latter in the absence of a convenient corn mill—are most valuable machines where horses are kept, much more so than many farmers appear to imagine. It is perhaps a little troublesome at first to get horses, accustomed to long hay, to use it in the chaffed state, and "trouble," as we well know, has led to the neglect of many useful things besides chaff cutters. Extra trouble is what too many farm servants mortally hate, and they will try every dodge to get a machine condemned which involves even a small share of it. But it should not be forgotten that the value of chaff cutters has been well proved, and that all who have continued to use them, and to combine crushing the oats along with chaffing the hay, have found it decidedly beneficial and economical.

The horses may become accustomed to chaffed hay or oat straw which has been prepared by the cutter by mixing a portion of the chaff with the oats; and, in fact, oats should not be given without some chaffed hay or straw among them, especially if the oats are not crushed, as a mixture of chaff compels the horses to masticate the oats thoroughly. There are some horses which have a fashion of bolting their oats without sufficient mastication, but we have seldom found a "bolter" of this kind succeed when chaffed hay was mixed with the corn. Oats that are not properly masticated pass through the animal in an unimpaired state, and we see the results in the corn sprouting and growing up where the dung from the stable yard has been put out on the land.

A full allowance of oats, when oats and hay alone are used, varies from 12 lbs. to 14 lbs. daily, and when the work is more than usually heavy even 16 lbs. are given, divided, of course, into at least three feeds. We have always acted on the principle of frequent feeding, "little and often," that is, as often as the arrangement of the work would allow; and we have done so, because we consider it highly dangerous to allow a horse to eat a large quantity of oats greedily, which he will certainly do if kept long at work without feeding. Long fasts, followed by heavy feeds, is a sure way to bring on colic and inflammation of the bowels, which may be entirely prevented by an opposite

system of management. At one time a valuable cart horse came into our hands, which was notorious for his liability to severe fits of colic. He had been chiefly employed on the road, and the man who drove him was in the habit of working him for many hours without feeding, giving him a feed early in the morning and another at night when he came to the stable. By adopting the plan of "little and often" the horse was perfectly cured of his tendency to colic, and we never had any trouble with him on that score.

Some disapprove of giving cooked food to farm horses, but our experience has long since convinced us that it is not only a useful auxiliary in the dietary of the stable, but even an indispensable article. During summer and autumn horses are chiefly, we may say wholly, fed on green food, and a sudden change to dry hay is not advisable. The plan adopted by many experienced farmers is to give each horse 6 lbs. of bruised oats at five o'clock in the morning, and a similar quantity at noon, with 47 lbs. steamed food at half-past seven in the evening. To make 47 lbs. of steamed food requires almost 62 lbs. of raw turnips and potatoes, along with about 1½ lb. of wheat chaff. For the latter we have substituted chaffed hay, and in each feed—that is, 46 lbs. of steamed food—3 to 4 ozs. of salt should be mixed. Swedes and potatoes are the best materials to make up the bulk of the steamed food, and these articles are better when mixed together than when used alone. Even should potatoes be diseased, they can be used in this way, provided they are firm and not rotten. The husks of oats, or meal seeds, as these are called, should be studiously avoided, and other mill refuse which is occasionally mixed up with the food of horses, as the use of such leads to the formation of those balls which are sometimes found of considerable size in the stomach.

There is one article which is very common in the north of Ireland, as well as elsewhere, the value of which, as part of the winter food for horses, does not appear to be sufficiently understood. We allude to whins, the young shoots of which, when properly prepared, become an excellent and particularly wholesome article of food for horses and cows. When prepared by an efficient bruising machine, 14 lbs. of whins are sufficient to make a feed at night for a horse; but if the whins have been run through a chaff cutter, which is a common mode of preparation in some parts, it will take four times that quantity, owing to the greater waste. By using whins we save hay, for it has been found that horses do very well upon whins without any hay. Whenever we see the horses on a farm in poor condition, while there are plenty of whins growing on the fences, we experience a feeling of regret that their owner should think so lightly of an

article which is of the greatest value to him, and ready at his hand. Whins are now extensively grown in some parts of Ireland for the express purpose of feeding horses and cows during winter, and we should be glad to see their value better appreciated in the north.—*From the Journal of the Chemico-Agricultural Society of Ulster.*

18.—*Affections of the Bladder amongst Fattening Sheep and Lambs.* By W. E. Litt, M.R.C.V.S.*

In asking myself, at the outset, "what are the peculiar affections of the bladder amongst fattening sheep and lambs, to which the Royal Agricultural Society wish to call particular attention?" I confess to a feeling of some little difficulty. I have had very considerable experience in the diseases of sheep, and many opportunities of observation, and I know only of *one* such affection. It may be that other parts of the country furnish a different class of maladies to that over which my own practice has ranged—for such things are by no means uncommon amongst domestic animals—and that I have partially mistaken the intended subject. Whether this is so or not, however, is perhaps of little consequence, as the particular disease to which I allude is of sufficient importance to demand the most earnest attention of all who are interested in the pursuits of agriculture.

If the urine of sheep during the process of fattening be subjected to the ordinary simple test of litmus paper, it will generally be found to afford some indications of the presence of an acid. This must be looked upon as altogether an abnormal condition of things, as, under ordinary circumstances, the urine of herbivorous animals will always be found to exhibit an alkaline reaction. The effect of high feeding, therefore, appears to be to assimilate in some measure this particular secretion to that of the carnivora. The *exact* nature and character of the acid in question is a matter which demands a greater amount of consideration at the hands of the chemist than it has hitherto received; but, though differing somewhat in composition, it appears to bear a considerable analogy to that which is known to the physiologist as *uric*, or *lithic* acid, and when it is present in excess, the urine, generally scanty under these circumstances, will always be found to deposit a sediment more or less abundant, and differing somewhat in character and appearance according to the exact nature of its base. For the most part, however, it

* Prize Essay: reprinted from the 'Journal of the Royal Agricultural Society.'

may be said to consist of certain of the salts of soda, potass, or lime, with a greater or less admixture of what is known as the ammonia-magnesian phosphate, or triple salt. This peculiar morbid condition of the system is one to which all domestic animals are occasionally liable; but it is so exceedingly common in fattening sheep and lambs, that its special consideration can scarcely fail to be a subject of considerable interest.

The reasons why these sandy or gravelly deposits of the urine are more common and more serious in sheep than in other animals, will be sufficiently apparent when we consider the peculiar circumstances under which fattening sheep and lambs are placed. A high and stimulating system of feeding, with an abundance of saccharine roots, want of exercise, and often a total abstinence from water, are exactly the conditions likely to produce this tendency to lithic sediments in the urine; and the peculiar anatomical construction of the urethra of the sheep is such, that deposits of a character which would pass away readily enough in other animals, soon begin to produce the most serious mischief in him. At the extreme point of the penis is a singular structure known as the "vermiform appendage," so called on account of its worm-like appearance; and the urethral outlet is here so extremely small that the slightest calcareous deposit can with difficulty pass through it. When this lithic acid diathesis, so to speak, then is present, the urethra readily becomes choked up with the sediment, the urine is filtered through it only with the greatest difficulty, coming away merely drop by drop, and accompanied with much straining and other manifestations of pain and suffering. If the obstruction is not speedily got rid of, these symptoms rapidly increase in severity, the bladder becomes inordinately distended, its membranes are inflamed, and great constitutional disturbance necessarily follows. The kidneys in turn participate in the inflammation, the blood becomes thoroughly saturated and poisoned with urine, which may be smelt in all the secretions and tissues of the body, and the animal soon sinks under so serious a complication of diseases. Occasionally, also, rupture of the bladder may be added to the list of evils; but this I have found to be much more rare than might at first sight be expected; when it does take place, however, I need scarcely add that death is the inevitable result.

It will thus be seen that what are commonly spoken of as "affections of the bladder in fattening sheep and lambs," are confined almost exclusively to male animals, that is, to wethers and rams, and in reality are not in the first instance affections of the bladder at all; the bladder is only affected, as it were second-hand, by the mechanical impediment offered to the evacuation of

its contents through the natural channel, and will, therefore, require but little of our attention in considering the best means of treatment for the evil in question.

If I am right in the view I have here taken of the true nature of these affections—and I have had very many opportunities of investigating the subject—the treatment to be observed, whether preventive or curative, can scarcely be a matter of controversy. When the disease is found to prevail to any extent amongst a particular flock, attention must be immediately directed to the exciting causes, and these will for the most part be readily enough ascertained. As I have already hinted, the character of the diet, the absence of water, and the want of exercise, are the most probable causes. It is not easy, perhaps, to specify at all times the exact article of diet most in fault. Often, doubtless, it is rather a combination of several ingredients, than any one in particular, to which the mischief is attributable; but, as far as my own observation goes, I am inclined to think that *the saccharine roots, and particularly mangold-wurzel, are especially injurious*, although it must be borne in mind that those articles of food in which starch is abundantly found, such, for example, as barley, wheat, and the like, are equally productive, under particular circumstances, of these sabulous deposits. *So far as is practicable, therefore, the preventive treatment must always be initiated by such an alteration of the diet as will exclude those articles which abound largely in saccharine and starchy matters, and an allowance of moderate exercise and free access to water will do the rest.* The effect of a regimen like this is most marked, and I have had many opportunities of observing and approving its beneficial results.

The curative treatment of the disease is a more serious and difficult matter. Generally, it is true, when we are dealing with wethers alone, the most economical plan is to hand over the affected animal to the butcher at once, and to endeavour to arrest the further extension of the malady by the simple preventive means to which I have just pointed. Cases will often arise, however, where it is desirable to prolong the animal's life, and most especially is this the case in highly-bred rams, in which I have found the disease to be particularly fatal. As these animals often possess a value far, very far beyond what the butcher would give for them, their treatment is just as much a matter of interest and consideration to the farmer as that of either his horses or his cattle, and it is desirable, therefore, that I should enter somewhat at length into this most important division of the subject.

An observant shepherd will first be made aware of the presence of the affection in question by the usual symptoms of

disease. The animal is dull and more or less off his feed, holding himself aloof from his fellows, and generally lying down. When roused or lifted up, the peculiar nature of his malady will become manifest at once by the painful efforts made to pass his urine. His breathing is quickened, and he strains almost constantly, whilst only a few drops are observed to come away. If the patient be now turned up on his rump, and the penis drawn out, it will generally be found that the urethra, or at least that portion of it comprised in the vermiform appendage, is choked up with the sediment of which I have already spoken. This sediment differs considerably in its character, varying from the appearance of very fine gravel to that of the finest sand. Until this is removed, it will be seen at once that there is little to be done in the way of remedy; and the urethral termination is so very small that to remove it is often a matter of much difficulty. When of the consistence of fine sand, however, a little patient manipulation will often be crowned with the required success. As there is commonly some local inflammation of the neighbouring parts, it is always advisable to commence proceedings by fomentation with warm water; afterwards gently pressing the urethra so as to force out the accumulated deposit. Having succeeded either wholly or partially in this, a little sweet oil may then be applied to the parts, and a dose of opening medicine administered. Either castor-oil or fine linseed-oil—in doses of 2 to 6 ounces according to the size and strength of the patient—are preferable to the ordinary saline aperients; and where much constitutional disturbance is present, I always add to this dose from 8 to 16 grains of the extract of belladonna. On the following day the urethra must be again examined, and, if necessary, the proceeding already described may be repeated, the medicinal treatment being now made to consist of the free exhibition of some of the alkaline carbonates, and the best is, unquestionably, the carbonate of potass, as the salts of potass are for the most part perfectly soluble, and will readily pass off dissolved in the urine. Carbonate of potass may then be given in doses of half a dram to a dram, two or three times a day, dissolved in water, either alone, or in combination with the belladonna or other febrifuge medicines, as may be found necessary. And here I would remark that, without proper regard to regimen, no treatment will be of much avail. Air, exercise, proper diet, and the free use of water, are of the utmost importance. Physicians tell us that the lithates are sometimes thrown down, not from undue acidity of the urine, but simply from that fluid not containing the due quantity of water to hold them in solution, and that in such cases a tumbler of [illegible] spring water taken night and morning, will at once

cause the cessation of this morbid symptom. This fact is important, and though too much reliance must not be placed on analogy with human medicine, I am satisfied, from practical observations, that water is a most valuable adjunct to other treatment in the removal of the disease in question, and where sheep refuse to drink it voluntarily their medicine should always be largely diluted with it.

It is not always, however, that the removal of the sediment from the urethra can be so easily effected. On the contrary, it will frequently be found of such a character (gritty, and of the size of small seeds) that it cannot possibly be passed through the external opening. In such cases I have never hesitated to make an incision on the under surface of the urethra, as near the extremity as possible, generally, indeed, in the vermiform appendage itself, large enough to allow this gravel to be pressed out. Sometimes, indeed, the simplest and most desirable mode of proceeding is to remove this structure altogether. In wethers there cannot be the slightest objection to so simple an operation at any time; but in rams the case is somewhat different. It is generally believed that this peculiar appendage is intended by nature to perform some important function in the act of copulation, and that where it has been removed the ram is no longer capable of procreation. I am not fully prepared, at the present moment, either to endorse or contradict this opinion; but I am assured by a distinguished sheep-breeder in this district, that the commonly received opinion on this subject is an erroneous one, and that he has had many lambs got by rams which had undergone the mutilation in question. At all events, the matter appears to be so far one of grave doubt that it is much to be desired that satisfactory experiments should be instituted with a view to settling the question. Be this as it may, however, I am satisfied that a longitudinal incision, such as I have just described, may be made into the organ without in any way impairing its supposed functions, and there need not, therefore, be any reason to hesitate in such a course of proceeding when the circumstances of the case appear to render it necessary. By such means, with frequent fomentations and careful manipulation, the obstruction may often be removed; and a proper observance of the medicinal treatment already pointed out will complete the cure. It is only just to add, also, that cases will occasionally be met with in which these accumulations are so abundant, occupying not only the urethra, but also the bladder, ureters, and even the kidney itself, that no treatment can be of any service. Such cases may always be distinguished by observing that little or no relief follows the removal of the deposit from the penal portion of the urethra, and from the greater amount of constitutional disturbance which marks

their progress. Once satisfied that the extent of the mischief is such as to preclude all hope of remedy, the flockmaster must have recourse to the butcher's knife as soon as possible, as the whole system now rapidly becomes so thoroughly impregnated with urine, that the meat is no longer wholesome as food.

Such is the brief history of a disease which has of late years prevailed very largely in this part of the country, and has therefore come frequently under my observation. I have taken considerable interest in the subject, and given some attention to the causes, nature, and treatment of the malady; and these remarks are simply the practical conclusions and deductions at which I have arrived. It would have been easy for me to have extended and amplified the views here expressed, but I have preferred to be as concise and practical as possible, believing that I should thus be better understood and appreciated by those who have the deepest interest in this matter. Such is unquestionably the particular object of these papers, and I confess I am not without hope, therefore, that the sheep-farmer may find something of value and importance in what I have here written.

Shrewsbury.

19.—*The Agricultural Products at the Paris Exhibition.* By Count HENRI ZICHY of Ödenburg, Hungary, one of the Jurors of the Exhibition.*

ACCORDING to the verdict of all, the Universal Exhibitions since 1851 have been held in far too short periods after each other. It is impossible to effect anything of an extraordinary kind in any branch of industry, by new, useful, and practical inventions, in such short spaces of time as four or five years; especially in agriculture, where it requires at least a generation to create entirely new branches.

Owing to the natural want of anything new and interesting, and owing to the impossibility of drawing conclusions of the state of agriculture from the objects exhibited, this paper must needs be very meagre; the more so as in class 67 ("Cereals and other Farinaceous Products, and the Products derived from them") there are not even all those products of the soil included for judgment which were in the corresponding class of the London Exhibition of 1862.

We had to judge, in one whole, bread and food produce, in the strictest sense—viz., the four principal species of cereals;

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* Abridged from the Journal of Agriculture.' Edinburgh, 1867.

further, also, rice, buckwheat, and Turkish wheat; millet, sorghum, also all meal and farinaceous products.

France.—In France, according to official reports, there were, in 1820, scarcely over 4,600,000 hectares planted with wheat, which produced 54,000,000 hectolitres; in 1857 it was computed that there were 6,500,000 hectares, and the harvest produced 110,400,000 hectolitres. It is seen herefrom that, in the period from 1820 to 1857, the cultivated area has increased 50 per cent., whilst the produce has doubled itself. At present there are above 7,000,000 hectares; and the produce has risen in every way. France exports far more wheat flour than wheat in the grain; in the year 1864 the quantity exported amounted to 1,300,000 hectolitres wheat, against 2,000,000 hectolitres flour.

Of rye about 20,000,000 to 22,000,000 hectolitres are produced, of which 1,000,000 are used for distilling purposes in the north—in Belgium and in Holland; but, wherever practicable, rye is replaced by wheat.

Barley is produced in France to the amount of about 10,000,000 hectolitres, of which 2,000,000 are distilled and malted; of these 2,000,000 England takes more than a third part.

Oats are calculated to produce 90,000,000 hectolitres per annum. It is rarely exported: on the contrary, often imported from Odessa, Sweden, and Ireland.

The yearly produce of buckwheat amounts to from 6,500,000 to 6,700,000 hectolitres, and is consumed in the country.

The produce of maize and millet amounts to at least 6,000,000 hectolitres.

The manufacture of starch and farina preparations is very considerable—the former requires yearly about 14,000,000 hectolitres potatoes. The farina produce has become equal in quality to the Italian, as, owing to the method of preparation, the percentage of glutinous matters has increased, by which any desired rich consistency can be given to the farina; the Italian produce, besides, owed its greater excellence only to the nature of the cereals, which are far richer in glutinous substances than the French.

France shows the following improvements since 1855: 1. The greater cultivation of the finer sorts of red and white wheats, which have less bran, and the glutinous properties of which produce finer kinds of flour, along with its elasticity and ductility. 2. Total abolition of the system "of producing starch by fermentation and decomposition of the glutinous matter," and the introduction of the watering method, whereby starch is produced in greater quantity and of a purer white. 3. Storage of cereals

in air-tight chambers. 4. The drying of flour by mechanical means in the open air.

Of all these improvements, the latter is, without doubt, the most interesting. Monsieur Tonallive, fils, 72, Boulevard de Sebastopol, is the inventor and patenteed proprietor of this machine, which is introduced in all the larger mills of France. The apparatus consists of large round metal plates, with double bottom, five stages above each other; the flour is heated by means of steam, which is driven into the spaces between the plates gradually, from 35° to 75°. In order to prevent the stoppage of the flour, a system of shovelling by spades, which are fixed crosswise to the centre of the plates in every stage, in half-eccentric, half-concentric, direction keeps the flour in continual motion, and throws it from the upper plate to that below. Five hundred kilogrammes are thus dried in one hour, and the watery substance, which in flour is generally calculated as 12 per cent., is reduced to 5 per cent.; and in this way the flour is, without much expense, ready to be stored away. It has lately been ascertained that flour that was dried in this manner in 1860, and had since been kept locked up under municipal surveillance, was found free from every foreign or strange taste, perfectly good, much whiter, and no alteration as regards its nourishing properties.

Of the objects exhibited by France, the productions of grinding, on the flat or horizontal principle, were in the first place worthy of notice. This system is now common in the greater part of France; it produces about 62 per cent. of the best flour, and is carried on on the greatest scale. Of the flour sorts *of six marks*, which are kept equal, those of Messrs. Darblay, jun., E. Morel, Trupanz, Deshayes, Labiches, Aubin, and Baron, Charles et Lefebre, J. Aubert, Adolf, Legendre, Masson, Mannorg, Saint Regnier, Vithcocq, Abel Leblanc, Marnat Solemn, E. J. D. Bouchotle, Plicque, and Bertrin Dupuy, carried off the palm.

Second in rank were the starch manufactures, and among others those of Messrs N. C. Bloch and Son, which surpassed in purity, whiteness, and strength all other sorts of starch in the Exhibition, and which are used for syrups and gums.

Not less remarkable are the farinaceous productions of the first rank, amongst which the manufactures of the house Magnin at Clermont Fruand excels as regards fine quality, pure taste, and natural colour.

Algeria. Algeria has preserved the reputation it has made for itself at the London Exhibition for cereals. From all parts

of that colony there are shown in superfluity heavy hard wheat sorts (*Triticum durum*), beautiful barley, among which a six-rowed (*Hordeum hexasticum*) is the most productive; also gigantic maize rich in farinaceous properties.

The export of cereals from Algeria has likewise greatly increased, according to the official catalogue. Three million hectolitres of wheat are exported, and seven million hectolitres of wheaten flour; of barley, at present only half a million hectolitres, which, however, can be easily raised to two or three million hectolitres.

Excellent productions were likewise shown by the process of groats-grinding in general, but in particular those of Messrs. Abel Prontianam Rouzi, Aviat, Louis Victor Benoit, J. Brunet Dupray, and Co. Not less worthy of mention are the collections of cereals of Messrs. Pilate et Bouvieres, of the Departments of the North Provinces; of Messrs. Vaury, Charpillin, and Co., who exhibit the productions of the poor soils of the Department des Andres; further, also, the collection of Messrs. Bignon; also the starch manufactures of Messrs. Manger, Bouchotte; also the farina and sago productions of Messrs. Groult, jun., Bastian et Mongrad, and Z. A. Bousguin; and lastly, the starch flours of the Island Reunion, and of the French Indies; and also the 112 sorts of rice exhibited here.

Holland.—The Netherlands were distinguished and unique in the production of buckwheat and flour products.

Belgium.—Belgium, through the agricultural societies of Ypres and East Flanders, exhibited a rich collection of rice products and rice flour. Messrs. Biseau d'Hauteville also showed rich cereals.

Germany.—The Prussian and North German States showed, above all, beautiful farinaceous productions: amongst those which held the first place were the mill of the royal domains at Bromberg, Messrs. Loebbecke in Halbertstadt, Lange of Kiel, and Beisert of Sprottau, all of which were distinguished by the purity and whiteness of the flour, and particular well-cleaned grain.

The superiority of the farinaceous manufactures of Messrs. Wittekopp of Brunswick was universally acknowledged.

The collections of the Grand-duchy of Mecklenburg and of the Baltic Union were numerous and instructive in cereals of all kinds.

The beautiful collection of the cereals and other agricultural products of Silesia which Captain Elsner von Gronow, from

Kalinowitz, exhibited, were deserving of great praise; but, on account of his being a juror, he had to renounce all public acknowledgments.

The Royal Agricultural Societies of Poppelsdorf, Waldaw, Proskan, and Eldena, by their well-assorted collections of cereals and seeds, offered an opportunity to the student of agriculture to perfect himself in this science.

The Grand-duchy of Hesse exhibited very pure and well-cleaned cereals; and from the Grand-duchy of Baden, Messrs. Bassermann, Herrschel, and Diefrenbacher, of Mannheim, exhibited excellent sago of all kinds.

The kingdom of Wurtemburg excelled in varieties of starch flours. Bavaria and Switzerland were weakly represented in this section. Spain furnished excellent productions of the flat-grinding system, for which its wheat is particularly well suited.

Rich in all cereals of the South was the collection of the Catalonian Agricultural Society of St. Isidoro, which was distinguished by an assortment of the most beautiful kinds of wheat. Of other exhibitors, the wheats of Messrs. Thomas Rodriguez and Andreas Olivas of Albacete were the finest.

Portugal.—Portugal was well represented in cereals; amongst others those of the Compagnie dos Lesivias were deserving of special notice, the more so because that company has reclaimed some barren tracts of land.

Greece.—From Greece the only collection of note was that of the Agricultural School of Tirynthe, which was likewise represented in London in 1862.

Russia.—Russia made the only magnificent show in cereals. The variety, quality, and purity of the cereals, which were exhibited in great quantities, as also the scientific grouping, gave this exhibition the foremost place. Of the many must be mentioned the wheat from the domains of the Prince Victor Vassiltchikoff, certainly the best in the Exhibition; the rich collection of cereals of the German colonies in Saratoo, which were at London in 1862 pronounced as extremely remarkable; and the cereals grown in the dreary north of Siberia by M. Bogolubstey of Nerchinsk; further, the assortments of Baron Michael Korff, from the province of St. Petersburg; of M. Alexander Dehn of Sippola, in the government of Wiburg, in Finland; of the Imperial crown-lands of Vologda and Perm; those of the Grand Duchess Helene at Karlovka, in the government of Poltava; and lastly, those of M. August Czarnecki of Dobryszyce, Warsaw.

Remarkable were the grains which had been produced past [illegible] of latitude and in perfect development, which necessi-

a particularly careful cultivation; further, the black rice ies exhibited by the German colonists of the government flis, which grow without irrigation on the plateaux of the asus.

ually interesting were the grain varieties of the government /land, in Finland. In order to preserve the rye and barley, subjected, when still in the straw, to a kind of drying oven, : it is dried by smoke, and is thrashed according to require- Rye which has been dried in this manner can be kept for ears and more without losing its germinating power, which r increases than decreases, we are told. It is preserved in dense masses, even in wood depôts, without requiring to be d over, and resists the bite of insects or vermin. In Russia n Sweden the dried corn is preferred to the undried for ier sowing; for even if the former is 50 per cent. higher in , scarcely half the quantity is required, on account of its inating capabilities.

the manufacture of cereals Russia has likewise made con- ible progress. All kinds of farinaceous productions were of lent quality.

e entire Russian collection was taken in hand by the Govern- , which caused scientific inquiries to be addressed to in- ng exhibitors, and the whole arrangement was intrusted to uiding and creative genius of M. Csernajeff, director of the cultural Museum of St. Petersburg, and whose fame extends yond the limits of his fatherland.

ly.—From Italy the farinaceous productions were above all passed, and, as stated above, the purity and delicacy of the is a result of the most excellent varieties of grain which been employed for this purpose. It is natural that the ictions of the Italian mills should be of particularly good ty, amongst which those of Messrs. Parditi and Traversa of o occupied the first place.

ce-grinding was very well represented; the rice in husks, as as the peeled kinds, are, as may be taken for a fact, the best urope. We found the finest in the collection of Messrs. Chiarini of Faenga; Augustin Ballarini of Irnola; Bunard ci of Milan; Anton Buini of Bologna; P. Magni of Pavia; Brothers Monari of Bologna, &c. The collections of Catana eruggia and of Pesaro were rich in the most beautiful ies.

rkey.—Turkey had a large show by 246 exhibitors; the numerous in the class, which had been brought together by ncouragement and care of the Government. The assort-

ment excelled more by the multiplicity of the objects and the different stages of quality, than by any particular qualifications. At all events, it showed a sincere and energetic will on the part of the Government to rank in this respect with the other progressing and cultivating states. The collection from Egypt was likewise improvised by the Government, and it was distinguished by very fine wheat sorts.

China, Tunis, and Morocco furnished nothing of any interest.

United States.—In the Department of the United States of America, the Glen Clove Starch Manufacturing Company was particularly remarkable for its production of maize flour (*Maizena*). The quality of the maize, as well as its excellent manufacture, may be the reason that this article cannot be produced in Europe. It thus stood unique in the Exhibition, and was excellent on account of its whiteness, purity, lightness, glutinous quality, and particularly delicate flavour.

Of the collections exhibited by individual States, that of Illinois is the most excellent, amongst which we found wheat from Mr. Anthony Zeilinger, of 66 lb. per bushel; then those of Mr. Mathias Betz, of Rappahanock wheat; also beautiful oats from Mr. C. H. von Olinda. After these collections follow those of the States of Washington, Ohio, Wisconsin, and Kansas, which distinguished themselves by their fine wheats, and by giant maize, the most beautiful in the Exhibition. The maize collection of Mr. W. S. Carpenter of New York was likewise very interesting.

Central and South America.—The Central States and Republics of South America showed little of importance.

Brazils.—The Brazils showed rich and beautiful cereals, which were well classified, and created the impression that this kingdom is making great progress in agriculture. These, as well as the various starch flours exhibited, deserve due consideration.

Great Britain.—The United Kingdom of Great Britain and Ireland exhibited very few cereals. We only noticed starch of peculiar purity and whiteness, which did honour to the manufacturers, Messrs. S. Berger and Co., near London; Innes, Orlando, and Co., and J. and J. Colman, both of London.

But if the Exhibition showed little of the agricultural productions of England, we found ourselves sufficiently repaid with the statistical tables, got up in a brief style, but comprehensive and full information which are contained in the Introduction

to the Catalogue of the British section, which, by the way, was sold on the day of the opening in four languages, whilst other countries had either no special catalogue at all, or they only made their appearance after the jury had performed their functions.

The objects exhibited in this class (says the British Official Catalogue) possess a great amount of interest, being intimately connected with the capabilities of the country to supply one of the staple articles of the food required by its population; and although the production of cereal crops in the United Kingdom is insufficient to supply the wants of the population, a large area of the country is devoted to their cultivation. Until the year 1866 no complete returns were made of the acreage of the entire kingdom under cultivation. The following table shows the extent of land under cultivation in each division of the kingdom, and the proportion of corn and green crops to the total area under crops and pastures, &c., as returned in 1866:—

1865.	Total Acreage under all kinds of Crops, bare Fallow, and Grass.	Acreage under Corn Crops.		Acreage. under Green Crops.	
	Acres.	Acres.	Per cent.	Acres.	Per cent.
England	22,261,833	7,400,170	33·3	2,750,008	12·3
Wales	2,284,674	521,074	22·8	139,265	6
Scotland	4,158,360	1,366,540	32·9	663,257	15·9
Ireland	15,549,796	2,173,433	14	1,482,091	9·6
Isle of Man ..	82,902	27,266	32·9	12,208	14·7
Jersey	20,357	3,142	15·4	5,253	25·1
Guernsey ..	11,999	2,041	17·0	2,938	24·4

The acreage of Ireland includes hill-pastures, which are not taken in in the other returns, and consequently make the percentage under corn less than it would be were it taken upon the same basis as in the other divisions of the kingdom.

There are no returns of the quantities of the several kinds of grain produced in the country; but as regards wheat, it is estimated to amount to about 27 bushels per acre in England and Wales and Scotland, and to 25 bushels in Ireland. This would give an estimated produce of about 12,364,000 quarters for the United Kingdom, excluding the Isle of Man and Channel Islands.

The chief corn-growing districts in England are situated in the eastern and south-eastern parts of the country; the midland and western counties also produce corn, but a large extent of of their area is under grass. In Scotland the same division exists, corn being grown principally in the eastern counties, and grass in the south and south-western. In Ireland the corn-pro-

ducing districts are situated in the northern and southern portions of the island.

The following extracts from Mr. Caird's work on English agriculture afford a complete view of the changes which farming operations have undergone during the present century. On a comparison of the statistics collected by him in 1850-51 with similar information obtained by Mr. A. Young, in twenty-six counties in England in 1770, the following progress was observable:—

	1770.		1850.	
	s.	*d.*	*s.*	*d.*
Rent of arable cultivated land per acre	13	4	26	10
Produce of wheat per acre	23 bush.		26¾ bush.	
Wages (average) per week	7	3	9	7
House rent do. do.	0	8	1	5
Price of bread per lb.	0	1½	0	1¼
Price of meat per lb.	0	3¼	0	5
Price of butter per do.	0	6	1	0

It thus appears that, in a period of eighty years, the average rent of arable land has risen 100 per cent.; the average produce of wheat per acre has increased 14 per cent.; the labourer's wages 34 per cent., and his cottage rent 100 per cent.; while the price of bread, the great staple food of the English labourer, is about the same as it was in 1770. The price of butter has increased 100 per cent., meat about 70 per cent., and wool upwards of 100 per cent. Since the year 1850, the value of butter, meat, and wool has considerably further risen in price.

The increase of 14 per cent. in the average yield of wheat per acre does not indicate the total increased produce. The extent of land in cultivation in 1770 was without doubt much less than it is now; and the produce given then was the average of a higher quality of land, the best having of course been earliest taken into cultivation. The increase of acreable corn produce has therefore been obtained by better farming, notwithstanding the contrary influence arising from the employment of inferior soils. The increased breadth now under wheat, with the higher average produce, bears, however, no proportion to the increase of rent in the same period; and the price of wheat now is much the same as it was then. We must therefore look to the returns from stock to explain this discrepancy.

While wheat has not increased in price, meat, butter, and wool have nearly doubled in value. The quantity produced has also greatly increased, the same land now carrying larger cows, cattle which arrive at earlier maturity, and of greater size, and sheep of better weight and quality, and yielding more wool. On dairy farms, and on such as are adapted for the rearing of stock, especially of sheep stock, the value of the annual produce has

kept pace with the rent. With the corn farmer the case is very different. In former times the strong clay lands were looked upon as the true wheat soils of the country. They paid the highest rent, the heaviest tithe, and employed the greatest number of labourers. But modern improvements have entirely changed their position. The extension of green crops and the feeding of stock have so raised the productive quality of the light lands that they now produce corn at less cost than the clays, with the further important advantage that the stock maintained on them yields a large profit besides.

The average prices of British wheat, barley, and oats, per imperial quarter, were, during the five years from 1861-65, as follows:—

Year.	Wheat.	Barley.	Oats.
	£. s. d.	£. s. d.	£. s. d.
1861	2 15 4	1 16 1	1 3 9
1862	2 15 5	1 15 1	1 2 7
1863	2 4 9	1 13 11	1 1 2
1864	2 0 2	1 9 11	1 0 1
1865	2 1 10	1 9 9	1 1 10

It has already been stated that the home production of corn in the United Kingdom is inadequate to the wants of the population, and vast quantities are therefore imported. During the twelve years from 1854 to 1865, the average annual value of corn imported into the kingdom amounted to no less than 24,000,000*l.* sterling. The quantities of the principal descriptions of corn imported in 1865, and the sources of supply, are indicated in the following Table:—

	Wheat.	Wheat Flour.	Barley.	Oats.	Maize.
	cwts.	cwts.	cwts.	cwts.	cwts.
Russia	8,160,000	..	..	1,963,000	1,194,000
Sweden	..	..	..	3,090,000	..
Denmark ..	647,000	..	1,550,000	1,071,000	..
Hanse Towns	..	..	400,000	..	..
Prussia	5,426,000	..	770,000	65,000	..
Holland	..	..	..	726,000	..
France	2,266,000	3,058,000	1,583,000	..	..
Moldavia and Wallachia ..	..	..	..	..	545,000
Turkey	..	..	2,087,000	..	3,178,000
British North America ..	307,000	181,000	..	..	..
United States	1,183,000	262,000	..	..	1,771,000
Other Countries	2,946,000	382,000	1,428,000	796,000	399,000
Total	20,935,000	3,883,000	7,818,000	7,711,000	7,087,000

The countries named in the above Table, with the addition of Egypt, which for many years furnished large quantities of wheat, barley, and maize, have been the chief sources of supply for the last fifteen years. Owing to the late civil war in the United States, the quantities of grain received from that country in 1865 were considerably below the ordinary importations. Corn and grain are liable to an import duty of 3*d.* per cwt., and flour to 4½*d.* per cwt.

Large quantities of rice, sago, tapioca, semolina, macaroni, and vermicelli, which are not produced in the country, are also imported. In the year 1865 the following importations were made:—

Articles.	Quantity.	Value in £.
Rice in husks .. .. qrs.	6,478	15,310
Rice without husks .. cwts.	1,938,816	1,330,941
Sago .. .. „	148,582	121,285
Tapioca .. .. „	22,363	37,025
Semolina (peeled barley) .. „	2,453	2,773
Macaroni and Vermicelli .. „	7,786	18,012
Total	..	£1,525,346

The total number of persons engaged in agriculture in each division of the United Kingdom in the year 1861 was:—

	Males or Men.	Women.	Total.
England and Wales	1,457,075	376,577	1,833,652
Scotland	215,716	120,773	336,489
Ireland	850,121	81,714	931,835
Total	2,522,912	579,064	3,101,976

The condition of the agricultural labourer in all parts of the country has long been the subject of consideration. As an employment agriculture affords less remuneration to the workman than any other occupation. The rates of wages vary considerably in all parts of the country; but in those districts in which even the highest wages are paid, the condition of the labourer is not at all satisfactory.

According to reports which were laid before Parliament in the year 1861, the highest and lowest weekly wages, without board and lodging, amounted to:—

	Men.						Women.						Children.					
	s.	d.		s.	d.		s.	d.		s.	d.		s.	d.		s.	d.	
England—																		
Most south-west .. / Lowest south-west ..	8	0	to	10	0		3	0	to	5	0		1	6	to	7	0	
Most northerly .. / Highest north	12	0	„	16	6		4	2	„	8	0		3	6	„	7	6	
Wales	8	0	„	15	0		3	0	„	6	0		3	0	„	9	0	
Scotland	10	0	„	16	0		4	0	„	8	0		2	0	„	7	0	
Ireland	5	7	„	10	2		2	9	„	5	0		1	7	„	4	0	

The weekly wages may be increased with extra work by 2*s.* to 5*s.*

Much progress has been made in agricultural science in the United Kingdom of late years, and more especially in England and Scotland. The improved methods of farming introduced, including a better system of rotation in crops, a vast extension of drainage and of the use of artificial manures, as well as of the employment of machinery for many farming operations, have tended to place the agricultural industry of the country in a far better position than it formerly occupied. The increase in the rearing of live stock on farms has also been attended with very profitable results; and the recent experiments of steam cultivation on clay lands are reported to have been highly successful. The annual exhibitions of the Royal Agricultural Society, and the several international and other exhibitions that have taken place since 1851, have been the means of increasing the use of the most improved machinery; while the researches of many eminent chemists and scientific men have led to a better understanding of the nature of soils, and consequently have largely contributed to the welfare of the agricultural industry of the kingdom.

These figures tell more than hundreds of glass bottles which are sealed up and filled with some kind of grain, and dragged from one exhibition to another. A statistical table like the English one would be of more use.

English Colonies.—The English colonies gave proof of improving agriculture. South Australia made a beautiful show with its fine wheats, which excited general admiration, and which were exhibited by Messrs. A. Bell, Waddell, W. Halkett, and A. Smith. Barbadoes, the Mauritius, and St. Vincent had excellent arrowroot; Canada magnificent flour, and a fine collection of cereals of the agricultural school of St. Anna. Among the many excellent wheats, we have particularly to note those of Mr. W. Logan, as also his barley and maize; the wheat of Mr. J. Mitchell and of Mr. J. Barday; as also the superb barley of Mr. J. Patterson.

The Cape of Good Hope had a small collection of various

fine cereals; and from Natal there was shown good wheat and millet.

Malta—a collection of little importance, among which some fine *Triticum polonicum.*

Nova Scotia showed cereals which do honour to that cold climate; and Newfoundland—pretty good barley, considering its high latitude. On the other hand,

Victoria displayed the wealth of the south. It was difficult to make comparisons and to find differences in the quality. The wheats of Messrs. Robert Buchanan, John Orlebar, W. Nelson, and J. G. Dorker, the barley of the Varrenheits Distillery Company, and of Messrs. Gough and Co., were the most superb. From Queensland pretty good wheat was shown.

New South Wales displayed a not less rich collection in cereals —the wheat of Messrs. M. J. Prapitt, the maize of Messrs. A. Cobroft and J. & W. Macarthur, and the malting barley of Mr. M. J. Frankland, rivetted our attention.

British Guiana and Lagos furnished the usual produce of intertropical countries.

The British East Indies were rich in cereals, particularly in rice, millet, and sorghum, among which the collections of Captain Martin, of Major Polland, of the Governments of Bengal and Bombay, as also those of her Highness the Begum of Bhopal, and of the Maharajah of Buhadas, were the most interesting.

Austria.—Before entering upon the Austrian Exhibition, some statistical data may be found interesting.

The land was cultivated in 1865 as follows:—

	Acres.	Per cent.
Arable land	33,581,922	8·35
Meadows and gardens	14,294,000*	2·15
Pastures	15,067,302	16
Forests	30,993,199†	33
Total of productive acreage ..	93,936,423	..

The yearly produce amounts at an average as follows:—

Wheat	48,584,000 bushels.
"	15,000,000 "
Rye	64,518,000 "
Barley	49,958,000 "
Oats	99,544,000 "
Maize	43,076,000 "
Rice	516,000 cwt.

* Among which are 1026 acres rice-fields, and 1,045,177 of vineyards.

† Among these are 53,516 acres olive, laurel (bay leaf), and chesnut plantations.

The following comparative Table shows the imports and exports of all kinds of grain :—

	1863.	1864.	1865.
IMPORTED.	cwts.	cwts.	cwts.
Wheat and spelt	705,441	1,004,811	600,000
Rye, buckwheat, millet, and maize	1,057,755	1,957 447	1,431,270
Barley, malt, and oats	549,555	559,909	357,221
Rice	53,990	58,178	59,158
Flour and mill-ground produce ..	318,938	391,880	343,670
Value in florins*	13,339,400	18,073,219	14,445,310
EXPORTED.			
Wheat and spelt	1,863,085	2,445,973	4,968,351
Rye, millet, maize, and buckwheat	1,429,060	887,815	2,476,447
Barley, malt, and oats	949,798	976,430	2,296,205
Rice	129,919	171,231	155,380
Flour and mill-ground produce ..	740,011	811,864	1,183,753
Value in florins	28,315,200	34,000,529	49,558,023

The following Table shows the state of the steam grain-mills from 1852 to 1864, since which all information and statistics are wanting :—

PROVINCES.	State in 1852.		State in 1863.	
	Machines.	Horse-power.	Machines.	Horse-power.
Austria (proper)	4	141	13	362
Styria	..	..	2	30
Corinthia Carniola	..	..	2	24
Coast Land	3	78	3	78
Bohemia	5	120	36	724
Moravia	4	79	19	313
Silesia	..	..	8	80
Galicia	..	..	19	480
Hungary	13	276	133	2840
Croatia and Slavonia	1	16	7	274
Siebenburgen (Transylvania)	..	..	2	34
Military Frontier	..	..	4	42
Dalmatia	..	..	2	28
Total	30	710	251	5379

These figures show plainly that, in spite of drought, of wars, and deficient harvests, Austria has not gone back as regards agriculture; and in the grinding by steam it has made a considerable step in advance.

* The money value of the exported hops, rapeseed, clover, and mustard seeds, is included in the amount of exports.

On account of many of the exhibitors whose names were entered in the catalogue not making their appearance, the number of them is reduced to the following: For cereals and malt, 36 exhibitors; for mill produce, including starch, 42; for prepared flour and farina, and compressed yeast, 11—total, 89 exhibitors, of whom belonged to the Hungarian crown-lands, exhibitors in cereals, 24; in mill produce, 20; in prepared flour, farina, &c., 4—total, 48. Although the number of exhibitors was greater by eight than at the London exhibition, yet this class comprehended considerably fewer objects as regards cereals; one saw neither such quantities, nor such varieties, not even the excellent quality, which caused such astonishment in London.

This may be attributed as well to the bad harvests of the preceding years as to the conviction, which is getting more and more deeply seated, that the frequent recurrence of Universal Exhibitions has little influence upon the rise of demand and the consequent greater produce and more lucrative sale of the cereals. What, however, was wanting in cereals in the Austrian department, was amply made good by ground produce from the mills; these produced a good show.

It was generally acknowledged that the productions of the whole Austrian mills for gries or grit-grinding (*monture ronde*) were not only to be preferred to those of the same class exhibited by other countries, but that before all, the Hungarian, and then the Austrian, mills produced absolutely the best, the finest, the purest, and whitest flour in the Exhibition.

If even the jurors did not find always the barley so well husked as it could be seen in the Prussian and French sections, or if the bran sorts were a little more broken and somewhat changed in colour, the quality of the flour was unapproachable; for the Austrian mills make it their chief aim to produce only the best possible flour, whilst others put more value on the production of husked grain, and upon large, smooth, and elastic grain.

As regards the advantage of grinding the breadstuffs in the country, and about the means of encouraging the erection of steam mills, and to increase the export of flour, so much has been said in the Transactions of all Chambers of Commerce during late years, that it is unnecessary and waste of time to repeat anything here, the more so as in the short space of four years no considerable commercial changes have taken place.

20.—*The Meteorology of the South-West of England,* 1866 *and* 1867. By Nicholas Whitley.

The two Januarys of 1866 and 1867 will long be noted for the extreme fluctuations of their temperatures, the heavy gales from the south-east which resulted from these alternations of cold and heat, and the great loss of life and shipping on the south-western coasts. The year 1866 commenced with a period of cold weather, with heavy showers of snow and hail, which continued till the 10th of January, when the cold wind from the north passed to the south-east; then a terrible storm of wind and rain suddenly burst on our south-eastern shores, and upwards of thirty vessels were wrecked in Torbay alone. The snow was of a peculiarly dense nature, known as "sticking snow." It was found sticking and freezing around the telegraph-wires, cumbering them with large bundles of ice, and by its weight breaking down miles of the wire. A foot deep of ordinary snow is equal, when melted, to an inch of rain; but in this case the snow was so dense that a foot was equal to 2½ inches of rain. The early part of February was much above the average temperature: the south-west wind pervaded the whole country and extended its winter warmth into the Continent. In southern Sweden the mildness of the weather was such that navigation and all agricultural works proceeded as if it were the middle of May.

The usual easterly wind of spring commenced in the beginning of March, and, alternating with winds from the south and west, produced a heavy downfall of rain. We have been accustomed to consider the south-west wind the wettest, but for the past two years the heaviest falls of rain have occurred with a south-east wind. We must not, however, conclude that the humidity comes from this quarter; the south-west wind, sweeping over the humid and warm surface of the Atlantic, is the carrier which brings the vapour over the land; but when in winter the wind shifts suddenly to the south-east, the cold blast acts as a powerful condenser on the warm vapour and brings it to the ground in torrents of rain. On looking through my register, I find that on seven different occasions in the past two years more than an inch of rain was thus deposited by the south-east wind, and once it exceeded 2 inches.

The temperature of March, April, and May was 3° below the mean; but a warm period commenced in June, and at the latter end of that month the heat in the western counties was intense for the season. On the 28th of June, at Wrafton, North Devon, I found the temperature in the shade 87°; and, observing that the animals were suffering from the great heat, I placed a thermometer in a stable which was covered with a slated roof: it

marked 83°, while under a thatched roof it stood at 73°; so that a good thatched roof shielded the horses from 10° of heat. July was a dry month, having only one-third of its usual quantity of rain; the temperature was also in defect. But the wet, backward spring pressed the harvest-season into the latter part of August and the later crops into September, when the south-west wind almost constantly prevailed and the rainfall was double its usual amount: nearly 8 inches fell at Truro, and 14 inches at Goodamoor, South Devon. The westerly wind penetrated and flooded much of the country, and a comparatively heavy corn crop was much damaged and stained by the continued wet. During this wet season the fluctuations of the barometer were great and rapid, the wind was unsteady in direction and force, and the rain fell mostly at night.

The latter part of the year was also wet and mild, and on Christmas Day strawberries and primroses were in blossom in my garden.

The *Meteorology of* 1867 was as remarkable and instructive as that of any year I have ever recorded. It commenced with a gentle wind from the north-east, which day after day accumulated the cold and snow over the western lands. On the 5th the wind suddenly passed to the south-east, when a heavy storm of wind and rain fell with great intensity on the southern coast. It passed as rapidly as it rose; and on the morning of the 6th, with a south-west wind, the weather was as mild and warm as May, and the temperature for several following days greatly exceeded the mean of the season. Again, on the 10th, the north wind set in; gently and uniformly it swept over the whole country, bringing the arctic cold over these western lands and covering the ground with a mantle of snow. On the night of the 14th my thermometer fell to 11°, On the high land at Alternun Vicarage it registered 4°, and in the eastern counties at many places it fell below zero. Again the wind passed ominously with the sun, first to the east, and on the 20th veered to east-south-east, and then another storm burst on the Channel with a power and force equal to that on the 5th. It reached its maximum of intensity at 4 P.M., and died out at night. The exhausted wind, still following the course of the sun, fell to the south-west, and the country became suffused with warmth and loaded with humidity. The interior walls of the houses, chilled by the previous cold, precipitated the moisture and ran with water. On the morning of the 23rd the temperature of rooms without fire was 44°; in the open air it was 53°. On going out [illegible] the thermometers I felt as if passing into a heated room: [illegible] not, and filled with the fragrance exuding from [illegible] vessels of the wounded trees. The scent from a [illegible] especially powerful and extended to full 50 feet

around it. So powerful is the effect of the south-west wind of winter in driving back even intense cold. I have examined this subject more in detail in another paper,* and drawn the following inferences :—

1. Cold, especially when accompanied with snow and continued frost, is, in the south-west of England, a storm breeder.
2. After severe cold of many days' standing in winter, heavy gales may be expected; and when at such a time northerly wind shifts to east and south-east a storm is near.
3. Other things being equal, the force of the storm will be in proportion to the amount of difference of temperature between the cold air of the land and the warm air over the Atlantic ocean.

I was also enabled, during the continuance of the snow, to determine its protecting influence, at seasons of severe cold, on the wheat-plant. I placed a thermometer on the surface of the soil under the snow, and another on its surface; the first almost constantly remained at the freezing-point, but that on the surface of the snow fell to 10°. Thus a coating of only 4 inches of snow so repelled the cold that there was a difference of 22° between the sides of the thin snow bed.

Notwithstanding the great cold of January, the return of the south-west wind raised the temperature of February 5° above the mean at Truro. The spring months were warm and genial, except that in the middle of May there was a return of cold, when night frosts injured the tender vegetation. June was cold from the prevalence of north winds, but the air was dry; a finer hay harvest was never known than that at the latter end of June. The heat of July was also deficient, and the rainfall larger, especially in the eastern counties. The harvest was a fortnight late, and the weather in the middle of August was hot and favourable for gathering it in, but in many places it was laid by destructive storms; the straw was heavy, but the ear ripened badly. The crop in the west was good, and in some districts abundant, but in the eastern counties it was below an average. The oat-crop was universally good: in passing from Eastbourne to Newhaven I examined on the chalk hills four pieces of oats, which, being too heavy for the scythe, were being "swooped" with the reaping-hook, and the produce was not over-estimated at 100 bushels the acre. I had before noted the heavy crops on these South Down hills, and on trying the seed the past year on a Devonshire farm it yielded 70 bushels the statute acre.

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* 'Journal of the Royal Institution of Cornwall,' 1867.

TABLE I.—Showing the Mean Temperature of each Month for the Places mentioned.

Names of Places.	Height above the Sea.	Oct.	Nov.	Dec.	Year.	Jan.	Feb.	Mar.	April.	May.	June.	July.	Aug.	Sept.
	feet.	°	°	°	°	°	°	°	°	°	°	°	°	°
Greenwich (mean of 35 years)	159	50·4	43·6	39·4	49·4	36·5	38·8	42·0	46·8	53·7	59·7	62·5	61·9	57·3
Truro (mean of 10 years) .	55	51·1	47·1	43·8	51·1	42·8	42·7	44·6	48·6	54·1	58·8	60·1	61·1	57·7
		1865.				1866.								
Truro (Royal Institution) .	55	58·7	48·4	47·0	51·7	46·3	43·5	42·0	47·3	49·4	56·7	59·9	57·6	56·8
Guernsey	123	56·4	49·5	45·8	51·3	46·2	44·6	42·3	47·7	49·9	57·1	58·4	58·5	55·8
Barnstaple	20	55·0	47·2	44·3	52·1	45·3	43·5	41·7	49·3	52·3	60·5	61·7	59·0	55·9
Sidmouth	26	..	..	..	..	45·3	42·8	41·9	47·2	48·5	56·8	59·7	58·6	55·4
Oxford	210	50·6	44·9	42·8	49·9	42·8	40·3	41·0	48·2	50·5	61·1	61·2	59·4	56·0
Ventnor	150	56·5	48·8	45·9	52·6	46·0	44·2	43·0	50·6	52·5	61·3	62·8	61·4	58·5
Osborne.	172	..	..	..	..	44·1	42·4	41·2	47·8	51·0	60·1	62·1	60·1	56·2
Clifton	228	50·7	44·5	43·3	49·9	43·0	40·6	40·3	47·9	50·5	59·6	60·2	58·5	54·7
Greenwich	159	50·9	44·8	42.4	50·3	42·6	40·5	40·5	47·9	50·1	60·9	61·0	59·4	56·4
Norwich.	39	..	45·4	42·6	..	41·4	40·5	40·5	47·7	49·4	59·6	58·6	58·1	56·6
York	50	49·5	42·9	40·9	48·1	41.2	39·0	38·4	44·8	48·5	56·9	58·7	56·7	53·7

TABLE I.—Showing the Mean Temperature of each Month for the Places mentioned.

Names of Places.	Height above the Sea.	Oct.	Nov.	Dec.	Year.	Jan.	Feb.	Mar.	April.	May.	June.	July.	Aug.	Sept.
	feet.													
Greenwich (mean of 35 years)	159	50°·4	43°·6	39°·4	49°·4	36°·5	38°·8	42°.0	46°·8	53°·7	59°·7	62°·5	61°·9	57°·3
Truro (mean of 10 years) .	55	51·1	47·1	43·8	51·1	42·8	42·7	44·6	48·6	54·1	58·8	60·1	61·1	57·7
		1866.				1867.								
Truro (Royal Institution) .	55	53·8	49·6	49·0	50·9	39·5	47·9	40·9	50·2	51·6	56·5	59·1	60·5	56·9
Guernsey	123	54·0	49·3	48·0	50·9	40·1	46·6	41·4	48·1	52·4	55·8	58·3	60·6	58·2
Barnstaple	20	54·0	48·8	47·9	51·6	..	47·1	39·9	49·0	53·5	58·5	61·4	62·2	58·0
Sidmouth	26	53·1	48·4	46·4	50·3	37·7	46·4	38·5	48·8	51·5	56·6	59·3	59·9	56·9
Oxford	210	51·9	45·0	43·4	50·1	35·1	45·0	37·7	49·9	53·6	57·1	59·7	61·8	57·2
Osborne	172	53·5	47·0	45.0	50·9	35·9	45·6	38·8	48·9	52·3	58·2	59·7	60·9	58·3
Clifton	228	51·5	46·2	44·5	49·8	35·7	45·0	37·1	48·6	52·5	57·5	59·1	61·2	56·6
Greenwich	159	51·3	44·3	42·9	49·8	34·2	44·7	37·7	49·0	53·4	58·1	59·4	62·0	57·6
Norwich	39	52·9	44·3	42·7	49·8	34·4	44·0	37·0	50·7	..	56·6	..	61·5	57·5
York	50	50·8	42·9	41·6	47·8	32·5	42·6	35·7	46·1	49·9	56·0	57·0	60·3	55·5

TABLE II.—Showing the Depth of Rain in Inches for each Month at the Places mentioned.

Names of Places.	Height above the Sea.	Oct.	Nov.	Dec.	Year.	Jan.	Feb.	Mar.	April.	May.	June.	July.	Aug.	Sept.
	feet.													
Greenwich (mean of 35 years)	159	2·67	2·53	2·02	24·78	1·68	1·58	1·61	1·73	1·96	1·83	2·37	2·40	2·40
Truro (mean of 10 years) .	55	4·08	6·11	4·90	44·08	4·66	3·79	3·44	2·54	2·41	2·79	2·64	3·04	3·68
		1865.				1866.								
Truro (Royal Institution) .	55	9·1	5·0	5·0	48·4	6·9	5·4	4·6	3·9	2·5	3·3	0·9	4·7	7·9
Guernsey	123	9·1	6·5	1·9	43·3	7·9	5·8	2·5	2·2	2·5	1·6	1·6	3·8	9·4
Barnstaple	20	5·5	4·1	2·5	38·7	6·0	4·5	3·2	1·6	1·0	2·1	3·1	4·0	7·1
Sidmouth	26	..	..	..	..	5·9	3·6	2·9	2·4	2·1	1·8	1·1	1·8	8·9
Oxford	210	5·4	2·6	2·0	28·9	2·9	2·9	1·7	2·0	1·7	3·2	2·0	3·0	5·7
Ventnor.	150	8·8	3·2	2·5	32·7	4·6	4·2	2·2	2·2	0·9	1·7	0·8	2·9	7·2
Osborne	172	..	..	..	..	4·5	4·9	2·2	1·6	1·2	1·6	1·5	2·6	8·7
Clifton	228	5·0	3·3	3·4	36·7	4·2	4·8	2·1	1·7	1·1	3·6	2·7	3.3	7·4
Greenwich	159	5·9	2·4	0·9	29·0	3·7	4·0	1·6	2·4	1·9	3·6	1·6	2·4	3·9
Norwich	39	..	1·9	1·3	..	1·9	4·7	1·4	1·3	1·8	2·7	2·6	0·8	2·8
York	50	4·4	2·1	1·1	23·3	1·6	2·5	1·4	1·1	0·6	2·6	2·9	3·1	4·0

TABLE II.—Showing the Depth of Rain in Inches for each Month at the Places mentioned.

Names of Places.	Height above the Sea.	Oct.	Nov.	Dec.	Year.	Jan.	Feb.	Mar.	April.	May.	June.	July.	Aug.	Sept.
	feet.													
Greenwich (mean of 35 years)	159	2·67	2·53	2·02	24·78	1·68	1·58	1·61	1·73	1·96	1·83	2·37	2·40	2·40
Truro (mean of 10 years)	55	4·08	6·11	4·90	44·08	4·66	3·79	3·44	2·54	2·41	2·79	2·64	3·04	3·68
		1866.				1867.								
Truro (Royal Institution) .	55	2·6	3·0	5·0	50·7	6·7	3·4	5·4	3·5	3·5	1·1	3·8	1·0	1·3
Guernsey	123	1·3	2 7	3·2	44·5	5·5	2·2	6·4	2·1	2·2	0·8	4·2	1·1	3·9
Barnstaple	20	2·4	3·9	5·2	44·1	5·9	..	3·2	3·5	2·5	1·2	3·7	2·1	2·3
Sidmouth	26	3·0	2·0	2·4	37·9	4·9	1·9	5·0	2·3	4·3	0·9	3·9	1·8	3·0
Oxford	210	2·1	1·5	2·0	30·7	2·6	1·6	2·9	2·6	2·5	1·9	3·9	2·4	1·6
Osborne.	172	1·6	1·9	2·0	34·3	3·7	2·3	2·8	1·8	1·9	1·6	3·7	2·5	2·2
Clifton	228	1·9	2·4	4·9	40·1	4·9	2·7	4·9	3·4	2·5	2·1	2·7	2.0	1·3
Greenwich	159	2·1	1·5	1·8	30·5	2·8	1·2	2·3	2·2	2·3	1·8	5·8	2·7	2·9
Norwich	39	0·7	2·9	2·7	26·3	3·8	1·9	1·6	2·8	..	1·0	..	1·5	2·4
York	50	1·9	2·4	1·8	25·9	2·0	1·4	1·4	3·0	1·9	2·7	2·4	4·2	1·9

21.—*Tithe Commutation Table.*

Communicated by H. SPACKMAN, Bath, Official Superintend

THE average prices of corn upon which the commutatio was founded, as provided by the 'Act for the Commutatio in England and Wales,' were,—

	s.	d.	
Wheat	7	0¼	per imperial bushe
Barley	3	11½	,,
Oats	2	9	,,

By the 'London Gazette' of 8th January, 1867, it appe average prices for the seven years ending on the Thu preceding Christmas Day, 1866, have been as follows:—

	s.	d.	
Wheat	6	0¾	per imperial bushe
Barley	4	3	,,
Oats	2	9¾	,,

And by calculation it will be seen that for every 10 rent-charge, as stated in the apportionments, the amount the year 1867 will be 98*l.* 13*s.* 3*d.*, which is nearly 1 above the last year's value, and a decrease of nearly 1½ p the average adopted for the apportionments.

The following statement, founded on Mr. Willich's 'A Commutation Tables,' shows that the average prices for thirty-one years since the passing of the Tithe Commutati 100*l.* 16*s.* 2½*d.*, being a little over ¾ths per cent. above thos the commutation was founded:—

	£.	s.	d.			
For the year 1837 ..	98	13	9¾	For the year 1855	..	
,, 1838 ..	97	7	11	,, 1856	..	
,, 1839 ..	95	7	9	,, 1857	..	
,, 1840 ..	98	15	9½	,, 1858	..	
,, 1841 ..	102	12	5¼	,, 1859	..	
,, 1842 ..	105	8	2¾	,, 1860	..	
,, 1843 ..	105	12	2¼	,, 1861	..	
,, 1844 ..	104	3	5¼	,, 1862	..	
,, 1845 ..	103	17	11¼	,, 1863	..	
,, 1846 ..	102	17	8¾	,, 1864	..	
,, 1847 ..	99	18	10¼	,, 1865	..	
,, 1848 ..	102	1	0	,, 1866	..	
,, 1849 ..	100	3	7¾	,, 1867	..	
,, 1850 ..	98	16	10			
,, 1851 ..	96	11	4¾			31
,, 1852 ..	93	16	11¼			
,, 1853 ..	91	13	5¾	General average for the last 31 years		
,, 1854 ..	90	19	5			

BATH AND WEST OF ENGLAND SOCIETY

FOR THE ENCOURAGEMENT OF

Agriculture, Arts, Manufactures, and Commerce.

ESTABLISHED 1777.

GENERAL LAWS,

AS AMENDED AT THE ANNUAL MEETING, JUNE 7, 1865.

I. The Society shall consist of a President, Vice-Presidents, Council, Treasurer, Secretary, Governors, and Members, and shall have the following objects:—

1st. To hold meetings in the West of England for the exhibition of breeding stock, agricultural implements, and such other articles connected with agriculture, arts, manufactures, or commerce, as may be determined upon by the Council.

2nd. To offer premiums for essays and reports on subjects affecting the agriculture of the West of England, and to publish a Journal for circulation.

II. The West of England shall be divided into two districts, to be called the Eastern and Western.

III. The boundary line separating Devon from Somerset and Dorset shall be the division of such districts.

IV. The Council shall consist of a president, vice-presidents, and forty-eight other members (twenty-four of whom shall retire annually by rotation, but shall be eligible for re-election), and shall be elected by the whole body of members. Twenty members of the Council shall be chosen from persons residing or representing property in the Eastern District, twenty from persons residing or representing property in the Western District, the remaining eight may be elected from the general body of members without reference to districts.

V. The election of President and Council shall take place at the annual meeting; and they shall enter into office at the conclusion of the annual meeting at which they have been chosen. The Council

shall have power to nominate Vice-Presidents, and fill up such vacancies in their own body as may from time to time occur during the interval between the annual meetings.

VI. The entire management of the Society, including the power of making bye-laws, of settling the prizes to be awarded, of nominating the committees, fixing the places of meetings, of appointing or removing the Treasurer, Secretary, and such other officers as may be required to carry on the business of this Society, shall be vested in the Council, who shall report their proceedings at the annual meeting, and submit them to the meeting for confirmation.

VII. The meetings for exhibitions shall be held in different towns in successive years.

VIII. Every subscriber of 1*l.* annually shall be a member; of 2*l.*, a governor, and eligible for election as a vice-president; and every yeoman and tradesman subscribing 10*s.* and upwards annually shall be a member of the Society; and all shall be deemed such, and liable to pay their subscription, until they shall give notice in writing to the Secretary of their intention to withdraw. The subscriptions to become due and be paid in advance on the 1st of January in each year. All firms of two or more persons shall subscribe not less than 1*l.* annually.

IX. The payment of 10*l.* in one sum shall constitute a member for life, and of 20*l.* in one sum a governor for life.

X. To entitle a member to exhibit, he must have been a member for three months, and have paid his subscription, of not less than 1*l.* for the current year, at least one month previous to the day of exhibition. Members subscribing less than 1*l.* and non-members will be permitted to exhibit stock, agricultural implements, or other articles, on payment of such a sum as the Council shall direct.

XI. Entries must be sent to the Secretary at least *sixty-two days* previous to the day of exhibition; who, upon their reception, shall forward by post printed forms of certificates to each exhibitor, which shall be filled up by him and returned to the Secretary at least *forty-eight days* previous to the day of exhibition.

XII. The annual meetings of the Society shall be held in the months of May or June.

XIII. If it be proved to the satisfaction of the Council that any person has attempted to gain a prize in this or any Agricultural Society by a false Certificate, or by a misrepresentation of any kind, such person shall thereupon be excluded from again exhibiting in this Society.

XIV. All prizes shall be open for competition to the United King-

dom. But no exhibitor of stock, or person intending to compete for any of the Society's prizes, shall be privy to the selection of judges to award the premiums.

XV. The proceedings of the Society, including the Prize Reports and List of Members, shall be printed annually, and every subscriber not in arrear with his subscription shall be entitled to receive one copy, free of expense, and there shall be an additional number printed for sale.

XVI. No new rule shall be proposed, or existing one altered or rescinded, excepting at an annual meeting, and then only provided a statement in writing shall have been sent to the Secretary at least twenty-eight days previously, setting forth the rule to be proposed, rescinded, or altered; and in the last case the proposed alteration shall be stated.

XVII. No subject or question of a political tendency shall ever be introduced at any meeting of this Society.

REPORT OF THE COUNCIL,

Read at the Annual Meeting held at SALISBURY, *12th June*, 1867.

THE Council have the gratification to report that there are at present on the books of the Society 65 Life Governors and Members; 100 Governors; 578 Members, subscribing not less than 1*l.* annually; 297 subscribers contributing 10*s.* annually; total 1040.

Financial Statement.—The financial statement for the year ending December 31st, 1866; and the assets and liability account for the same period have been printed and circulated among the Members. The Society's funded property remains the same as at the end of the year 1865, namely, 4923*l.* 12*s.* Consols; the value of the plant was estimated at 3153*l.* 3*s.* 2*d.*; and the cash in hand was 274*l.* 18*s.* 3*d.* The result of an examination of the account of the income and expenditure of the past year is favourable, inasmuch as the balance-sheet of the assets and liabilities of the year 1866, as compared with those of the year 1865, shows an increase of 210*l.* 15*s.* 10*d.* A different method has been adopted of stating the annual accounts, in order to show, as nearly as can be, the receipts and expenditure of the various divisions of the Society's operations, so that, referring to any one department, the cost and income connected with it may at once be seen.

The Salisbury Meeting and the Cattle Plague.—The Council deeply regret that, owing to the precautions deemed necessary to prevent the spreading of the Cattle Plague, not yet extinct in England, the Society is again unable to hold an exhibition of horned cattle. Anxious to redeem their engagement with the local authorities of Salisbury and the agriculturists of the county of Wilts, a deputation, comprising, amongst others, the President of the Society and the Mayor of Salisbury, waited on the Privy Council in the hope of being enabled to obtain permission to [illegible] show; but the Lord President, after courteously [illegible] the deputation and carefully reviewing their represen-

ations, ultimately arrived at the conclusion, that during the continuance of this visitation it would be impossible to allow any Society, whose operations extended over a large area, to hold an exhibition at which horned stock could be shown.

The Show of Sheep.—The Council have the satisfaction to state that, in the opinion of the judges and other persons competent to pronounce authoritatively on the subject, the show of sheep, especially that of the Hampshire or West Country Downs, for which the neighbourhood of Salisbury is so celebrated, is remarkably good.

The Horse Show.—The Horse Show, though not large in number, contains several animals of remarkable excellence; but the Council regret that the prizes offered for pairs of agricultural horses, for which the neighbourhood of Salisbury is noted, have not produced the expected competition. The prizes offered in former years for thorough-bred stallions having failed to elicit competition, have not been repeated this year; and the practice has been gradually introduced of giving prizes for produce.

The Show of Pigs.—The various classes of pigs are well represented; many of the entries are remarkably good.

Machinery and Implements.—No less than 46 compartments are occupied by machinery in motion; a very large space is also appropriated to the exhibition of valuable and important implements. The implement exhibition, as a whole, considering that the Society has met in the same locality for two years consecutively, is highly satisfactory.

The Poultry Show.—The Poultry Show fully maintains its interest and importance; but it will be desirable to consider a suggestion offered by the judges, hereafter to adopt a different classification of foreign birds.

The Horticultural Show.—A pleasing feature of the Meeting is the very beautiful display of flowers in the Horticultural Department, for which the Society is mainly indebted to the courteous liberality of distinguished patrons of horticulture in the neighbourhood of Salisbury.

The Arts Department.—The Council refer with satisfaction to the fine collection of works by living artists exhibited in the Arts Department, and desire to record their obligations to the Lord President of the Privy Council and the authorities at South Kensington for the fine collection of works in decorative art intrusted to the Society for exhibition.

The Meeting of 1868.—It has been decided that t
for 1868 shall be held at Falmouth.

The Council recommend that Sir John Thomas B
worth, Bart., be elected President for the ensuing
Mr. Tremayne, Mr. Henry George Moysey, Mr. Jons
and the Rev. T. Phillpotts, be elected Vice-Presiden
to supply the vacancies occurring in the Council by
following be elected:—

EASTERN DIVISION. — Ralph Allen, Bathampto
Andrews, Rimpton, Sherborne; W. A. Bruce, Ashle
ham; R. H. Bush, Victoria Square, Clifton, Brist
Fookes, Whitchurch, Blandford; J. D. Hancock, H
ton; Henry Parr Jones, Portway House, Warminst
Lush, Hartgills, Kilmington, Bath; H. A. F. Luttrell,
Court, Weston-super-Mare; Edmund F. Mills, Or
Mary, Devizes; William Thompson, Dunsford Plac

WESTERN DIVISION.—Edward Archer, Trelaske, I
Francis W. Dymond, Manston Terrace, Exeter; Ma
Growing, Collumpton; William Froude, Chelston
quay; John Gould, 2, Manston Terrace, Exeter; Jo
Chagford; Thomas Hussey, Waybrook, Exeter;
Pitts, Newton House, Drewsteignton, Chagford;
Scott, Ph. D., St. Leonard's, Exeter; William Wipp
Poltimore. Should Mr. Jonathan Gray be elected
dent, the Council recommend that the vacancy thereb
in the Eastern division for the year ending June, 18
by the election of Mr. Jerom Murch, of Cranwells, B

The Report was received and adopted, and the
Vice-Presidents, and Members of Council recom
election were by the Annual Meeting unanimously e

CHEMICAL ANALYSES OF MANURES, SOILS, &c.

Terms on which the Society's Consulting Chemist, DR. A. VOELCKER, *may be applied to by* MEMBERS ONLY:—

	£.	s.	d.
1. For advice on one topic..	0	7	6
2. For an opinion as to the genuineness of a sample of Guano..	0	7	6
3. Ditto ditto of Bone-dust	0	5	0
4. Ditto ditto of Oilcake	0	5	0
5. For determination of Ammonia in Guano or in other artificial Manures..	0	10	6
6. For partial analysis of Guano .. .. Such an analysis, except in cases of disputes, is sufficient to determine the commercial value of a sample of Guano.	1	1	0
7. For a complete analysis of Guano	1	10	0
8. For determination of soluble and insoluble Phosphate of Lime in a sample of Superphosphate	1	1	0
9. For a full analysis of a sample of Superphosphate.. ..	2	2	0
10. For analysis of Nitrate of Soda..	0	10	6
11. Ditto of Sulphate of Ammonia	0	10	6
12. Ditto of Oilcake	1	1	0
13. Ditto of Oilcake, including determination of Oil	1	11	6
14. For a determination of Lime in a Soil..	0	15	0
15. For determination of Lime, Sand, Organic Matter, and Clay in a Soil..	1	1	0
16. For a partial analysis of a Soil	2	2	0
17. For a full analysis of a Soil..	3	3	0
18. For partial analysis of a Limestone, Marl, or similar Mineral	1	1	0
19. For complete analysis of Limestone, Marl, &c.	2	2	0
20. For determination of Carbonate of Lime or Gypsum in Water..	1	1	0
21. For partial analysis of Water	2	2	0
22. For complete analysis of Water	5	5	0

Samples for examination to be sent free of charge.

Members wishing to exercise their privilege on the above-named terms may, if they please, forward their samples for examination *by parcel, prepaid,* direct to DR. AUGUSTUS VOELCKER, 11, Salisbury Square, Fleet Street, London, E.C.

The Professor's *fee must be paid in advance,* by Post-office order or cheque. But as in some cases information may be desired which is not clearly defined in the above list, members will do well to ascertain the expense which they are about to incur by communication with the Professor.

Samples of manures are best sent in tin canisters: ½ lb. to 1 lb. of a previously well-mixed sample taken from the bulk of manure is a sufficient quantity for analysis. If the manure is quite uniform, a much smaller quantity is required, and the sample, weighing about 3 or 4 ozs., is best sent by *post.*

The members of the Society are recommended in buying artificial manures to ask for an analytical guarantee. As very inferior manures are often sold on the strength of printed analyses, proving that the import of chemical terms used in copies of analyses is not generally understood, Professor Voelcker has kindly offered to give an opinion gratis on all copies of analyses which members may send to him with a directed and stamped envelope.

Bath and West of

ANNUAL ACCOUNT FOR THE YI

Ledger Follo.	RECEIPTS.		£. s. d.	£.
	BALANCES FOR THE YEAR 1866, viz.:—			
13	Messrs. Badcock		221 12 2	
31	Mr. Dymond		53 6 1	
				274
123	RECEIPTS OF FORMER MEETINGS:—			
	Balance of Amount received for Sheaves of Wheat		2 8 4	
	Woodley, J., Balance of Catalogue Account, 1866		5 0 0	
	Holmes and Son, for Horse-hire, 1866		1 4 0	
				8
89	SUBSCRIPTIONS FROM TOWNS:—			
	Falmouth		. .	900
104	DONATIONS		. .	2
	GENERAL RECEIPTS:—			
7	Dividends, viz.:—			
	On £4923*l.* 12*s.* 3 per Cent. Consols, 1 Year to Midsummer, 1867		145 4 10	
	ANNUAL SUBSCRIPTIONS RECEIVED:—			
91	Arrears	£91 19 0		
94	Subscribers of 10*s.*	115 12 0		
98	Ditto of 20*s.*	503 12 0		
100	Governors	262 14 0		
103	Life Compositions	30 0 0		
			1003 17 0	
				1149
	JOURNAL RECEIPTS:—			
107	Advertisements		8 7 9	
106	Sale of		0 18 0	
				9
	IMPLEMENT RECEIPTS:—			
	Shedding Fees:—			
119	For U. G.		23 3 0	
20	S. S.		161 0 0	
21	, O. S		410 12 0	
22	, S.S.L		24 6 0	
14	Entrance Fees		39 10 0	
[illegible]	Horse-hire		28 0 0	
				686
	Carried forward		. .	£3030

glaud Society.

)ING 31ST DECEMBER, 1867.

EXPENDITURE.

	£. s. d.	£. s. d.
Balance from last Account, being Sums due to Sundry Creditors who had not then presented their Checks for Payment	. .	281 6 9
EXPENSES OF FORMER MEETINGS, viz.:—		
Advertising in 1866	5 19 6	
Truckle, J., Judge of Shoeing, Salisbury Meeting, 1866 . .	1 1 0	
Careless, T. and H., 12 Squares of Glass	1 11 6	
Gratuity to Postman at Salisbury, omitted in 1866	1 10 0	
Stretton, Police Superintendent, for services at Salisbury, 1866 .	3 3 0	
Official Superintendent, Half-Year	50 0 0	
Assistant Secretary, Half-Year	5 0 0	
		68 5 0
GENERAL EXPENSES:—		
Salaries as follows:— £. s. d.		
Secretary 100 0 0		
Assistant Secretary 5 0 0		
Official Superintendent 50 0 0		
Accountant 40 0 0		
Ditto Commission on Collection of Subscriptions 22 13 3		
Storekeeper's Wages 94 0 0		
	311 13 3	
Council and other Meetings	37 17 0	
Rent of Offices	18 0 0	
Printing	179 8 6	
Stationery	43 18 10	
Postages	62 12 2	
Ten per Cent. wear and tear of Plant	35 9 3	
		688 19 0
JOURNAL EXPENDITURE:—		
Editor's Salary	250 0 0	
Printing	181 7 1	
Distribution	19 2 5	
Postages	25 15 0	
Payments for Papers	75 18 0	
Travelling Expenses	6 15 6	
Subscriptions to Societies, Books, &c.	6 5 0	
		565 3 0
IMPLEMENT YARD EXPENDITURE:—		
Shedding	113 4 5	
Labourers	51 14 7	
Lodging	8 8 0	
Stewards' Expenses	15 6 0	
Horse-hire	22 15 0	
Sundries	1 3 4	
Ten per cent wear and tear of Plant	148 10 0	
		361 1 4
IMPLEMENT FIELD EXPENDITURE:—		
Stewards	9 0 0	
Land	99 0 0	
Horses	1 2 6	
Labourers' Wages	4 15 0	
		113 17 6
Carried forward . . .	. .	£2078 12 7

ANNUAL ACCOUNT—*continued.*

Ledger Folio.	RECEIPTS.	£. s. d.	£.
	Brought forward	. .	303
	HORSE SHOW RECEIPTS:—		
116	Entrance Fees	. .	6
	SHEEP AND PIGS:—		
113	Entrance Fees	. .	12
	POULTRY SHOW RECEIPTS:—		
115	Entrance Fees	90 12 6	
	Commission on Sales	0 19 9	
172	LOCAL AND OTHER SPECIAL PRIZES:		
	Salisbury Local Committee	57 0 0	
	Miles, W., Shoeing Prizes	6 8 0	
	ARTS RECEIPTS:—		
122	Entrance Fees	68 18 0	
105	Catalogue	13 6 6	
179	ART UNION RECEIPTS:—		
	Sale of Pictures	141 0 0	
	Sale of Tickets	27 13 11	16
	Carried forward	. .	£36

ANNUAL ACCOUNT—*continued.*

EXPENDITURE.

	£. s. d.	£. s. d.
Brought forward		2078 12 7
HORSE SHOW EXPENDITURE:—		
Labour	6 6 9	
Horse Boxes	126 10 11	
Judges' Expenses	28 18 8	
Veterinary Inspector	15 15 6	
Prizes paid	255 0 0	
Fodder	29 15 1½	
Rosettes	1 8 4	
Sundries	0 12 0	
		464 7 3½
SHEEP AND PIGS:—		
Shedding	124 6 9	
Fodder	35 18 0	
Labour	2 14 8	
Stewards	14 5 0	
Judges	44 18 2	
Prizes { Sheep	296 0 0	
Prizes { Pigs	64 0 0	
Hire of Pens	33 0 6	
Rosettes	1 8 3	
Ten per cent. wear and tear of Plant	9 16 0	
		626 7 4
POULTRY SHOW EXPENDITURE:—		
Hire of Tent	45 0 0	
Stages	35 16 4½	
Labour	19 4 3	
Stewards	16 18 0	
Judges	14 2 0	
Prizes	150 0 0	
Food	5 13 0	
Expenses of Clerk	3 1 4	
Ten per cent. wear and tear of Plant	7 9 6	
		297 4 5½
LOCAL AND OTHER SPECIAL PRIZES:—	£. s. d.	
Prizes { Local	57 0 0	
Prizes { Special	6 6 0	
	63 6 0	
Labour	3 2 3	
Judges	4 0 0	
Sundries	0 3 0	
		70 11 3
ARTS EXPENDITURE:—		
Committee and Secretary, Expenses	38 7 9	
South Kensington Museum	23 12 6	
Printing	17 3 1	
Stationery	5 3 3	
Carriage	19 12 7	
Labourers	8 18 5	
Catalogue	6 12 0	
Repairs	5 15 0½	
Postage	14 8 0	
Assistants	72 0 2	
Packing	20 15 9	
Sundries	12 3 4	
Ten per cent. wear and tear of Plant	105 17 6	
		350 9 4½
ART UNION EXPENDITURE:—		
Purchase of Pictures		152 8 3
Carried forward		£4040 0 6½

ANNUAL ACCOUNT—*continued.*

Ledger Folio.	RECEIPTS.	£. s. d.	£.
	Brought forward	. .	3628
	ADMISSIONS:—		
110	Single Admissions at 2*s.* 6*d.*	881 2 6	
,,	Ditto at 1*s.*	736 5 0	
111	Children at 1*s.*	22 2 0	
,,	Ditto at 6*d.*	49 3 6	
112	Sundries	1 9 6	
			169
198	SUNDRIES:—		
	Receipts of Cloak Room	6 16 2	
	Parcel Office Fees	0 19 3	
	Tin Tickets for Forfeits	0 6 0	
	Waste Paper sold	0 2 10	
105	CATALOGUE RECEIPTS:—		
	Privilege of Sale	. .	3
206	REFRESHMENTS:—		
	Privilege of Sale	. .	1
	PLANT, SALE OF:—	. .	
	Ten per cent. charged to the several departments for wear and tear of Plant, including 6*l.* 16*s.* loss on Placard Frames . .	. .	33
	Balance due to sundry Creditors who have not presented their checks for payment	. .	15
			£592

ANNUAL ACCOUNT—*continued.*

EXPENDITURE.

	£. s. d.	£. s. d.
Brought forward		4040 0 6¼
HORTICULTURE AND MUSIC EXPENDITURE:—		
Carpenters and Labourers	7 1 11	
Stewards	10 18 0	
Bands and Railway Fare	186 17 7	
Gratuities	84 2 0	
Carriage	7 3 10	
Tickets	3 6 8	
Band-Stand, &c.	10 0 4	
Ten per cent. wear and tear of Plant	13 10 0	
		323 0 4
PUBLIC ANNOUNCEMENTS:—		
Advertising	63 1 1	
Bill Posting	84 5 0	
Printing	20 11 0	
Rent of Placard-Frame Stores	6 4 7	
Ten per cent. wear and tear of Plant	10 13 0	
		184 14 8
SHOWYARD EXPENSES UNAPPORTIONABLE:—		
Hoarding and Offices	242 17 11¼	
Labourers	90 17 0	
Lodgings	7 0 6	
Stewards of Arrangements	14 10 0	
Finance Committee	15 18 9	
Secretary's Expenses	18 1 1	
Accountant's ditto	7 5 9	
Official Superintendent	9 0 0	
Clerks	52 17 5	
Money Takers	26 9 4	
Cloak Room	7 3 0	
Messengers	3 10 10	
Gatekeepers	7 15 8	
Carriage	194 4 9	
Police	78 18 8	
Catalogues	4 5 8	
Insurance	9 9 8	
Post Office	1 10 0	
Sundries	17 19 2	
		816 15 2¼
MISCELLANEOUS AND REFRESHMENTS:—		
Travelling	16 10 6	
Carriage	2 4 3	
Tent and Platform	39 9 8	
Shedding	5 16 11	
Badges	4 10 0	
Sundries	12 14 7	
		81 5 11
Purchase of Plant		91 10 9
BALANCES:—		
Messrs. Badcock	239 15 2	
F. W. Dymond	38 9 6	
Jonathan Gray	62 13 6	
Josiah Goodwin	50 0 0	
		390 18 2
		£5928 5 7

Examined and found correct, CLEMENT BUSH, GABRIEL S. POOLE, H. WILLIAMS. } *Members of the Finance Committee.*

Bath and West

ASSETS AND LIABILIT

Ledger Folio.	Assets.	£. s. d.	£.
5	Bath and West of England Old Stock	700 0 0	
	Bath and West of England 3 per cent. Consols	4223 12 0	4923 1
7	Dividend on Exeter Fund, to January, 1868 about	..	86
	Slack's Annuity, 25*l.* (doubtful)		
9	Value of Plant as per last Estimate	3153 8 2	
	New Plant as particularised in the Plant Account-Book	91 10 9	
		3244 13 11	
	Less Plant Sold	6 10 4	
		3238 3 7	
	Less 10 per cent. Depreciation, apportioned as follows, including the sum of 6*l.* 16*s.*, loss on Placard Frames:—		
	£. s. d.		
	General 35 9 3		
	Shedding 148 10 0		
	Stock 9 16 0		
	Poultry 7 9 6		
	Arts 105 17 6		
	Horticultural 13 10 0		
	Placards 10 13 0		
		331 5 3	
			2906 1
91	Arrears of Subscription	382 8 0	
	Less those in Arrears 3 Years, Resignations, Deaths, &c.	155 19 6	
			226
	CASH IN HAND, VIZ.:—		
	Messrs. Badcock	239 15 2	
	F. W. Dymond	38 9 6	
	Jonathan Gray	62 13 6	
	Josiah Goodwin	50 0 0	
			390 1
			£8483 1
	Balance brought down	.. ..	£7064 1

ngland Society.

31st DECEMBER, 1867.

Liabilities.	£. s. d.	£. s. d.
Stock Prize outstanding, 1867	5 0 0	
Sundry Creditors, as per Statement of Account-Book, folio 61	159 0 5	
Journal, cost of, not paid, estimated at	800 0 0	
ARREARS OF SALARIES:—		
Official Superintendent	50 0 0	
Assistant Secretary	5 0 0	
FALMOUTH MEETING	900 0 0	
		1419 0 5
Balance carried down	..	7064 16 7
		£8483 17 0

Bath and West of England Society,

FOR THE

Encouragement of Agriculture, Arts, Manufactures, and Comme

ESTABLISHED 1777.

List of Officers.

PATRON.

HIS ROYAL HIGHNESS THE PRINCE OF WALES, K.G.

VICE-PATRON.

THE RIGHT HON. LORD PORTMAN.

PRESIDENT

FOR THE YEAR ENDING JUNE, 1868.

SIR J. T. B. DUCKWORTH, Bart., Wear House, Exeter.

VICE-PRESIDENTS. (1867-68.)

*ACLAND, SIR T. D., Bart.	Killerton, Exeter
ACLAND, SIR P. P., Bart.	Fairfield, Bridgwater
*ACLAND, THOMAS DYKE, M.P.	Sprydoncote, Exeter
ASHBURTON, LORD	Alresford, Hants
BADCOCK, R. G.	Taunton
*BATH, THE MARQUIS OF	Longleat, Frome
BELFIELD, JOHN	Primley Hill, Torquay
BREMRIDGE, RICHARD	South Petherton
CAREW, W. P.	Antony, Devon
CLEVELAND, THE DUKE OF.	Bathwick, Bath
CLIFFORD, H. M.	Llantilio, Abergavenny
DAVEY, R., M.P.	Helston, Cornwall
DAVIE, SIR H. R. F., Bart.	Creedy Park, Crediton
*DEVON, THE EARL OF	Powderham Castle
DEVONSHIRE, THE DUKE OF	Chatsworth
DICKINSON, F. H.	Kingweston, Somerton
DIGBY, G. D. W.	Sherborne Castle, Sherborne
DRAKE, SIR T. T. F., Bart.	Nutwell Court, Devon
DREWE, E. S.	The Grange, Honiton
DUNTZE, SIR J., Bart.	Starcross
DURANT, R.	Sharpham, Totnes
FLOYER, JOHN, M.P.	Stafford House, Dorchester
FORTESCUE, THE E[illegible]	Castle Hill, South Molton
GRAY, JONATHAN	Backwell Hill, West Town, B[illegible]
HIPPESLEY, J. H.	Stone Easton, Somerset
HOOD, SIR A., Bart., M[illegible]	St. Audries, Bridgwater
HORNER, REV. J. S. H	[illegible]nells Park, Frome
HULSE, SIR E., B[illegible]	Breamore, Salisbury
KENNAWAY, SIR [illegible]	[illegible]scot, Ottery St. Mary
KING, R. K. [illegible]	Walford, Taunton
LANYFTON, T. [illegible]	Uphill, Weston-super-Mare
[illegible]NGTON, W. [illegible]	Newton Park, Bath
[illegible]PES, SIR M., [illegible], M.[illegible]	Maristowe, Roborough, S. Dev
[illegible] EARL OF	[illegible]ahla[illegible] Porlock, Some[illegible]

VICE-PRESIDENTS—*continued.*

MANSEL, JOHN C.	Longthorne, Blandford
*MILES, SIR W., Bart.	Leigh Court, Bristol
MOYSEY, H. G.	Bathealton Court, Wellington
NEVILLE-GRENVILLE, R., M.P.	Butleigh, Glastonbury
NORTHCOTE, RT. HON. SIR S. H., Bart., M.P.	Pynes, Exeter
PAGET, R. H., M.P.	Cranmore Hall, Shepton Mallet
PHILLPOTTS, REV. T.	Porthgwidden, Truro
PINNEY, W.	Somerton
PITMAN, SAMUEL	Bishop's Hull Manor, Taunton
POLTIMORE, LORD	Poltimore, Exeter
*PORTMAN, LORD	Bryanston, Blandford
PORTER, WILLIAM	Hembury Fort, Honiton
*PORTSMOUTH, THE EARL OF	Eggesford House, N. Devon
SAINT GERMANS, THE EARL OF	Port Elliot, Devonport
SANFORD, E. AYSHFORD	Nynehead Court, Wellington
SIDMOUTH, VISCOUNT	Upottery
SCOBELL, G. T.	Kingwell, Bath
*SILLIFANT, JOHN	Coombe, Copplestone
SMITH, P. PROTHEROE	Truro
STUCLEY, SIR G. S., Bart., M.P.	Hartland Abbey, Bideford
*TAUNTON, THE LORD	Quantock Lodge, Bridgwater
*TREMAYNE, JOHN	Heligan, St. Austle
TYRRELL, JOHN	Exeter
WAIT, W. SAVAGE	Woodborough, Bath
WALROND, J. W., M.P.	Bradfield, Collumpton

THE LORD WARDEN OF THE STANNARIES.
THE SURVEYOR-GENERAL OF THE DUCHY OF CORNWALL.
THE RECEIVER-GENERAL OF THE DUCHY OF CORNWALL.

, Those to whose names an asterisk (*) is prefixed have filled the office of President.

COUNCIL. (1867-68.)

Eastern Division.

Name.	*Address.*
LLEN, RALPH	Bathampton
NDREWS, H. G.	Rimpton, Sherborne
RUCE, W. A.	Ashley, Chippenham
USH, R. H.	Victoria Square, Clifton, Bristol
USH, CLEMENT	Weston, Bath
OTTERELL, J. H.	Bath
ANGER, THOMAS	Huntstile, Bridgwater
UCKHAM, THOMAS	Baysham Court, Ross
OOKES, HENRY	Whitchurch, Blandford
RAY, JOHN	Kingweston, Somerton
ANCOCK, J. D.	Halse, Taunton
ONES, HENRY PARR	Portway House, Warminster
USH, JOSEPH	Hartgills, Kilmington, Bath
UTTRELL, H. A. F.	Badgworth Court, Weston-super-Mare
ILLS, E. F.	Orcheston St. Mary, Devizes
URCH JEROM	Cranwells, Bath
OOLE, GABRIEL S.	Brent Knoll, Weston-super-Mare
OBERTSON, HENRY	Over Stowey, Bridgwater
HOMPSON, WM.	Dunsford Place, Bath
ILLIAMS, H.	Stinsford, Dorchester

Western Division.

Elected.	*Name.*	*Address*
1867	ARCHER, EDWARD	Trelaske, Launceston
1866	BRENT, ROBERT, M.D.	Woodbury, Exeter
1866	DAVY, JOHN TANNER	Rose Ash, South Molton
1866	DAW, JOHN	Exeter
1866	DAW, R. R. M.	Exeter
1867	DYMOND, F. W.	Bampfylde House, Exeter
1867	FARRANT, MARK	Growing, Collumpton
1867	FROUDE, WILLIAM	Chelston Cross, Torquay
1866	FRY, JOHN	Woodgate, Wellington, Somerset
1866	GORDON, CHARLES	Wiscombe Park, Honiton
1867	GOULD, JOHN	2, Manston Terrace, Exeter
1866	HICKS, W. R.	Westheath, Bodmin
1867	HOOPER, JOHN	Chagford
1867	HUSSEY, THOMAS	Waybrooke, Exeter
1866	LANGDON, GEORGE	Ashford, Barnstaple
1866	MAY, ROBERT	Rewe, Exeter
1867	PITTS, JAMES PITT	Newton House, Drewsteignton, Chagford
1867	SCOTT, W. R., Ph.D.	St. Leonard's, Exeter
1866	SILLIFANT, JOHN W.	The Cottage, Ottery St. Mary
1867	WIPPELL, WILLIAM	Cutton, Poltimore

Elected without reference to Districts.

OLE, JAMES	Knowle House, Dunster
ING, J. WEBB	West Everley, Marlborough
OLLIS, J. E.	Fitzhead Court, Taunton
AIN, THOMAS	Ugford Cottage, Salisbury
1867 RAWLENCE, JAMES	Bulbridge, Wilton
1867 STEVENS, J. C. MOORE	Winscott, Great Torrington
1866 VIDAL, E. U.	Cornborough, Bideford
1866 WILLYAMS, E. B.	Nanskeval, St. Columb.

PRESIDENT

FOR THE YEAR ENDING JUNE, 1868.

SIR J. T. B. DUCKWORTH, BART., Wear House, Exeter.

PUBLICATION COMMITTEE.

ACLAND, THOMAS DYKE, M.P., *Chairman.*

COTTERELL, J. H. | POOLE, G. S. | PORTMAN, THE LORD.

FINANCE COMMITTEE.

BUSH, C., *Chairman.*

HICKS, W. R. | POOLE, G. S. | WILLIAMS, H.

STOCK PRIZE-SHEET COMMITTEE.

GORDON, C., *Chairman.*

DANGER, THOMAS	FRY, JOHN	LUTTERELL, Colonel
DAVY, Captain	GRAY, JOHN	MILLS, E. F.
DUCKHAM, T.	HOLE, JAMES	PITTS, J. P.
FARRANT, M.	HUSSEY, T.	WILLYAMS, E. B.
FOOKES, HENRY	KING, J. WEBB	

IMPLEMENT REGULATIONS COMMITTEE.

GRAY, JOHN, *Chairman.*

FARRANT, MARK	GRAY, JONATHAN	KNOLLYS, J. E.
FROUDE, W.	JONES, H. P.	VIDAL, E. U.

CONTRACTS COMMITTEE.

GRAY, JONATHAN, *Chairman.*

GRAY, JOHN | SILLIFANT, J. W.

JUDGES' SELECTION COMMITTEE.

[illegible]OOKES, H.	GORDON, C.	LUTTRELL, Colonel
[illegible]RAY, JOHN	HUSSEY, THOMAS	WIPPELL, W.

RAILWAY ARRANGEMENTS COMMITTEE.

[illegible]RENT, Dr	[illegible]OPES, Sir M., Bart., M.P.
[illegible]	[illegible]MAN, S.

[illegible] COMMITTEE.

THE [illegible] STOCK	THE STEWARDS OF HORSES
THE STEWARD [illegible]	GRAY, JOHN

ARTS AND MANUFACTURES COMMITTEE.

DREWE, E. S., *Chairman.*

ACLAND, T. D., M.P., *Vice-Chairman.*

BRENT, R., M.D.
CARLYON, Rev. W.
DAW, J.
DAW, R. R. M.
DUCKWORTH, Sir J. T. B., Bt.
ENYS, F. G.
FALMOUTH, The Mayor of
FOX, R., Jun.
GRAY, JONATHAN
HICKS, W. R.
LONG, R.
NORTHCOTE, Rt. Hon. Sir S. H., Bart., M.P.
PHILLPOTTS, Rev. T.
PITMAN, S.
SCOTT, W. R., Ph.D.
SILLIFANT, J.
SILLIFANT, J. WOOLCOMBE
SMITH, P. P.
TWEEDY, R. N.
WALROND, J. W., M.P.
WILLIAMS, F. M., M.P.

Stewards of No. 1 Section.
HICKS, W. R. SCOTT, W. R., Ph.D.

Stewards of No. 2 Section.
DAW, J. PITMAN, S.

Stewards and Officers.

Steward of Implements (Yard).
GRAY, JOHN.

Steward of Implements (Elect, Yard).
FROUDE, W.

Steward of Implements (Field).
KNOLLYS, J. E.

Steward of Implements (Elect, Field).
JONES, H. P.

Stewards of Stock.
FARRANT, M. HOLE, J. FOOKES, H.

Steward of Stock (Elect).
FRY, JOHN.

Stewards of Horses.
GORDON, C. LUTTRELL, Colonel.

Stewards of Poultry.
BRENT, R., M.D. BUSH, R. H.

Stewards of Horticulture.
PHILLPOTTS, Rev. T. HICKS, W. R.

Steward of Music.
GRAY, JONATHAN.

Steward of the Mess.
MAULE, H. ST. JOHN.

Steward of Advertisements.
BUSH, C.

Stewards of Library.
COTTERELL, J. H. GRAY, JONATHAN.
THOMPSON, WM.

Stewards of Plant.
GRAY, JOHN KNOLLYS, J. E.
GRAY, JONATHAN WILLIAMS, HERBERT.

Stewards of Arrangements.
GRAY, JOHN GRAY, JONATHAN.

HON. SECRETARY.

MAULE, H. ST. JOHN.

ARTS HON. SECRETARY.

DAW, R. R. M., Exeter.

TREASURERS.

ADCOCK, R. | DYMOND, F. W.

OFFICIAL SUPERINTENDENT.

SPACKMAN, HENRY, 6, Terrace Walk, Bath.

ACCOUNTANT.

SMITH, WILLIAM, 26, Milsom Street, Bath.

CONSULTING CHEMIST.

VOELCKER, Dr. AUGUSTUS, 11, Salisbury Square, Fleet Street, E.C.

VETERINARY INSPECTOR.

BROWN, Professor G. T., White Horse Yard, New Cavendish Street, Portland Place, W.

ASSISTANT-SECRETARY—(Exeter).

ROBERTS, W.

SECRETARY AND EDITOR OF JOURNAL.

GOODWIN, JOSIAH, 4, Terrace Walk, Bath.

Council Meetings are appointed to be held on the last Saturday in the months of February, March and April, and on the last Tuesday in the months of July, August, September, October, and November.

Bath and West of England Society,

FOR THE

Encouragement of Agriculture, Arts, Manufactures, and Commerce.

ESTABLISHED 1777.

PATRON OF THE SOCIETY.

HIS ROYAL HIGHNESS THE PRINCE OF WALES, K.G.

Award of Prizes

AT THE

MEETING HELD AT SALISBURY

ON THE 10TH, 11TH, 12TH, 13TH, AND 14TH DAYS OF JUNE, 1867.

STEWARDS OF STOCK.

Mr. J. FRY, Woodgate, Wellington.
Mr. M. FARRANT, Growing, Collumpton.
Mr. H. FOOKES, Whitchurch, Blandford.

STEWARDS OF HORSES.

Mr. CHARLES GORDON, Wiscombe Park, Honiton.
Colonel H. A. F. LUTTRELL, Badgworth Court, Weston-super-Mare.

JUDGES OF STOCK.

Long-Wool Sheep and Pigs.

Mr. T. POTTER, Yellowford, Thorverton.
Mr. J. CLARKE, Long Sutton, Lincolnshire.
Mr. J. MOON, Plymouth.

Down and Dorset Sheep.

Mr. H. BONE, Ringwood.
Mr. C. RANDELL, Chadbury, Evesham.
Mr. J. CURETON, Shrewsbury.

Hacks and Hunters.

Mr. H. CORBET, Central Farmers' Club, London.
Mr, H. THURNALL, Royston.

Agricultural Horses.

Mr. B. E. R. HOWARD, Templebrewer, Sleaford.
Mr. B. V. WATTS, Turnworth, Blandford.

SHEEP.

LEICESTERS.

CLASS 19.—For the best Yearling Ram, 10*l.* Second ditto, 5*l.* Seven entries.

First Prize awarded to Mr. JOSEPH GOULD, Poltimore, Exeter, for his Ram, aged about 1 year 3 months and 1 week. Bred by himself.

Second Prize awarded to Mr. JOSEPH GOULD, Poltimore, Exeter, for his Ram, aged 1 year 3 months and 1 week. Bred by himself.

Commended.—Mr. GEORGE RADMORE, Court Hayes, Thorverton, Collumpton, Devon, for his Leicester Ram, aged 1 year and 3 months. Bred by himself.

CLASS 20.—For the best Ram of any other age, 5*l.* Second ditto, 3*l.* Two entries.

First Prize awarded to Mr. JOSEPH GOULD, Poltimore, Exeter, for his Ram, aged 2 years 3 months and 2 weeks. Bred by himself.

Second Prize awarded to Mr. JOSEPH GOULD, Poltimore, Exeter, aged 3 years 3 months and 1 week. Bred by himself.

CLASS 21.—For the best pen of five Yearling Ewes, 10*l.* Second, ditto, 5*l.* One entry.

First Prize awarded to Mr. JOSEPH GOULD, Poltimore, Exeter, for his pen of Ewes, aged 1 year and 3 months. Bred by himself.

COTSWOLDS.

CLASS 22.—For the best Yearling Ram, 10*l.* Second ditto, 5*l.* Ten entries.

First Prize awarded to Mr. JOHN KING TOMBS, Langford, Lechlade, Gloucestershire, for his Ram, aged 1 year and 3 months. Bred by himself.

Second Prize awarded to Mr. THOMAS HERBERT, East Leach Turville, Lechlade, Gloucestershire, for his Ram, aged 1 year 4 months 2 weeks and 1 day. Bred by himself.

Highly Commended.—Mr. JOHN GILLETT, Oaklands, Charlbury, Oxfordshire, for his Ram, 1 year 3 months and 1 week. Bred by Mr. Robert Lane, Cottage Farm, Northleach, Gloucestershire.

Highly Commended.—Mr. JOHN KING TOMBS, Langford, Lechlade, Gloucestershire, for his Ram, aged 1 year 3 months. Bred by himself.

The whole Class generally commended.

CLASS 23.—For the best Ram of any other age, 5*l.* Second ditto, 3*l.* Seven entries.

First Prize awarded to Mr. JOHN KING TOMBS, Langford, Lechlade, Gloucestershire, for his Ram, aged 3 years and 3 months. Bred by himself.

Second Prize awarded to Mr. JOHN GILLETT, Oaklands, Charlbury, Oxfordshire, for his Ram, aged 2 years 3 months and 1 week. Bred by Mr. Robert Lane, Cottage Farm, Northleach, Gloucestershire.

Highly Commended.—Mr. JOHN GILLETT, Oaklands, Charlbury, Oxfordshire, for his Ram, aged 2 years 3 months and 1 week. Bred by Mr. Robert Lane, Cottage Farm, Northleach.

Highly Commended.—Mr. JOHN GILLETT, Oaklands, Charlbury, Oxfordshire, for his Ram, aged 2 years 3 months and 1 week. Bred by Mr. Thomas Gillett, Kilkenny, Bampton, Oxfordshire.

[illegible] five Yearling Ewes, 10*l.* Second [illegible], 5*l.* [illegible].

[illegible] Prize awarded to Mr. JOHN GILLETT, Oaklands, Charlbury, Oxfordshire, for his pen of five ewes, aged 1 year 3 months and 1 week. Bred by himself.

Second Prize awarded to Mr. JOHN GILLETT, Oaklands, Charlbury, Oxford-

shire, for his pen of five Ewes, aged 1 year 3 months and 1 week. Bred by himself.

Commended.—Mr. THOMAS BEALE BROWNE, Salperton Park, Andoversford, Gloucestershire, for his pen of pure Cotswold Shearling Ewes, aged 1 year and 2 months. Bred by himself.

OTHER LONG-WOOLLED SHEEP.

CLASS 25.—For the best Yearling Ram, 10*l.* Second ditto, 5*l.* Seven entries.

First Prize awarded to Mr. GEORGE RADMORE, Court Hayes, Thorverton, Collumpton, Devon, for his Ram, aged 1 year 3 months. Bred by himself.

Second Prize awarded to Mr. CLARKE HALES, Manor House, Bassingbourne, Royston, Cambridgeshire, for his Ram, aged 1 year and 3 months. Bred by himself.

CLASS 26.—For the best Ram of any other age, 5*l.* Second ditto, 3*l.* Two entries.

First Prize awarded to Mr. GEORGE KINGDON RADMORE, Pitt Farm, Thorverton, Collumpton, Devon, for his Ram, aged 2 years 3 months 2 weeks and 4 days. Bred by himself.

Second Prize awarded to Mr. CLARKE HALES, Manor House, Bassingbourne, Royston, Cambridgeshire, for his Ram, aged 2 years and 3 months. Bred by himself.

CLASS 27.—For the best pen of five Yearling Ewes, 10*l.* Second ditto, 5*l.* Two entries.

First Prize awarded to Mr. CLARKE HALES, Manor House, Bassingbourne, Royston, Cambridgeshire, for his pen of Ewes, aged 1 year and 3 months. Bred by himself.

Second Prize awarded to Mr. CLARKE HALES, Manor House, Bassingbourne, Royston, Cambridgeshire, for his pen of Ewes, aged 1 year and 3 months. Bred by himself.

SOUTHDOWN.

CLASS 28.—For the best Yearling Ram, 10*l.* Second ditto, 5*l.* Eleven entries.

First Prize awarded to Sir WILLIAM THROCKMORTON, Bart., Buckland, Faringdon, Berks, for his Ram, aged 1 year and 3 months. Bred by himself.

Second Prize awarded to the Right Hon. the Earl of RADNOR, Coleshill, Highworth, Wilts, for his Ram, aged 1 year and 3 months. Bred by himself.

Highly Commended.—Sir WILLIAM THROCKMORTON, Bart., Buckland, Faringdon, Berks, for his Ram, aged 1 year and 3 months. Bred by himself.

CLASS 29.—For the best Ram of any other age, 5*l.* Second ditto, 3*l.* Four entries.

First Prize awarded to Sir WILLIAM THROCKMORTON, Bart., Buckland, Faringdon, Berks, for his Ram, aged 2 years and 3 months. Bred by himself.

Second Prize awarded to Sir WILLIAM THROCKMORTON, Bart., Buckland, Faringdon, Berks, for his Ram, aged 4 years and 3 months. Bred by himself.

Commended.—The Right Hon. the Earl of RADNOR, Coleshill, Highworth, Wilts, for his Ram, aged 2 years and about 3 months. Bred by himself.

CLASS 30.—For the best pen of five Yearling Ewes, 10*l.* Second ditto, 5*l.* Three entries.

First Prize awarded to Sir WILLIAM THROCKMORTON, Bart., Buckland, Faringdon, Berks, for his pen of Ewes, aged 1 year and 3 months. Bred by himself.

Second Prize awarded to the Right Hon. the Earl of Radnor, Coleshill, Highworth, Wilts, for his pen of Ewes, aged 1 year and about 3 months. Bred by himself.

HAMPSHIRE DOWN.

CLASS 31.—For the best Yearling Ram, 10*l.* Second ditto, 5*l.* Twenty-two entries.

First Prize awarded to Mr. ROBERT COLES, Middleton Farm, Norton Bavant, Warminster, Wilts, for his Ram, aged 1 year and 3 months. Bred by himself.

Second Prize awarded to Mr. JAMES RAWLENCE, Bulbridge, Wilton, Salisbury, Wilts, for his Ram, aged 1 year and 5 months. Bred by himself.

Highly Commended.—Mr. JAMES RAWLENCE, Bulbridge, Wilton, Salisbury, Wilts, for his Ram, aged 1 year 4 months and 2 weeks. Bred by himself.

Mr. WILLIAM FRANCIS BENNETT, Chilmark, Salisbury, Wilts, for his Ram, aged 1 year 4 months and 2 weeks. Bred by himself.

Commended.—Mr. WILLIAM FRANCIS BENNETT, Chilmark, Salisbury, Wilts, for his Ram, aged 1 year 4 months and 2 weeks. Bred by himself.

Mr. JAMES RAWLENCE, Bulbridge, Wilton, Salisbury, Wilts, for his Ram, aged 1 year and 5 months. Bred by himself.

Mr. JAMES RAWLENCE, Bulbridge, Wilton, Salisbury, Wilts, for his Ram, aged 1 year and 5 months. Bred by himself.

CLASS 32.—For the best Ram of any other age, 5*l.* Second ditto, 3*l.* Fourteen entries.

First Prize awarded to Mr. JAMES RAWLENCE, Bulbridge, Wilton, Salisbury, Wilts, for his Ram, aged 2 years and 4 months. Bred by himself.

Second Prize awarded to Mr. WILLIAM BROWNE CANNING, Elston Hill, Devizes, Wilts, for his Ram, aged 2 years and 4 months. Bred by himself.

Highly Commended.—Mr. JAMES RAWLENCE, Bulbridge, Wilton, Salisbury, Wilts, for his Ram, aged 2 years and 4 months. Bred by himself.

Mr. EDMUND OLDING, Ratfin Farm, Amesbury, Salisbury, Wilts, for his Ram, aged 2 years 4 months and 1 day. Bred by himself.

CLASS 33.—For the best pen of five Yearling Ewes, 10*l.* Second ditto, 5*l*, Eleven entries.

First Prize awarded to Mr. JAMES RAWLENCE, Bulbridge, Wilton, Salisbury, Wilts, for his pen of Ewes, aged 1 year and 5 months. Bred by himself.

Second Prize awarded to Mr. WILLIAM BROWNE CANNING, Elston Hill, Devizes, Wilts, for his pen of Ewes, aged 1 year and 4 months. Bred by himself.

Very Highly Commended.—Mr. WILLIAM FRANCIS BENNETT, Chilmark, Salisbury, Wilts, for his pen of Ewes, aged 1 year 4 months and 2 weeks. Bred by himself.

Highly Commended.—Mr. JAMES RAWLENCE, Bulbridge, Wilton, Salisbury, Wilts, for his pen of Ewes, aged 1 year and 4 months. Bred by himself.

Commended.—Mr. EDWARD WATERS, Stratford-sub-Castle, Salisbury, Wilts, for his pen of five Ewes, aged [illegible] year and 4 months. Bred by himself.

Mr. James Rawlence, Bulbridge, Wilton, Salisbury, Wilts, for his pen of Ewes, aged 1 year and 5 months. Bred by himself.

Mr. Alfred Morrison, Fonthill House, Tisbury, Wilts, for his pen of Ewes, aged 1 year 4 months and 1 week. Bred by himself.

HAMPSHIRE DOWN.

Class 34.—For the best five Four-teeth Ewes, with their Lambs, and in their Wool, 10*l.* Second ditto, 5*l.* Two entries.

First Prize awarded to Mr. James Rawlence, Bulbridge, Wilton, Salisbury, Wilts, for his pen of Ewes, aged 2 years and 4 months. Bred by himself.

Second Prize awarded to Mr. James Rawlence, Bulbridge, Wilton, Salisbury, Wilts, for his pen of Ewes, aged 2 years and 4 months. Bred by himself.

Class 35.—For the best five Six-teeth or Full-mouthed Ewes, with their Lambs, and in their Wool, 10*l.* Second ditto, 5*l.* Two entries.

First Prize awarded to Mr. James Rawlence, Bulbridge, Wilton, Salisbury, Wilts, for his pen of Ewes, aged 3 years and 5 months. Bred by himself.

Second Prize awarded to Mr. James Rawlence, Bulbridge, Wilton, Salisbury, Wilts, for his pen of Ewes, aged 3 years and 5 months. Bred by himself.

SHROPSHIRE.

Class 36.—For the best Yearling Ram, 10*l.* Second ditto, 5*l.* Seven entries.

First Prize awarded to Mr. Thomas Mansell, Adcott Hall, Shrewsbury, Shropshire, for his Ram, aged 1 year 2 months and 3 weeks. Bred by himself.

Second Prize awarded to Mr. Joseph Beach, The Hattons, Brewood, and Flour Mills, Dudley, Worcestershire, for his Ram, aged 1 year 2 months and 2 weeks. Bred by himself.

Class 37.—For the best Ram of any other age, 5*l.* Second ditto, 3*l.* Five entries.

First Prize awarded to Mr. Thomas Mansell, Adcott Hall, Shrewsbury, Shropshire, for his Ram, aged 2 years and 3 months. Bred by himself.

Class 38.—For the best Pen of five Yearling Ewes, 10*l.* Second ditto, 5*l.* Four entries.

First Prize awarded to Mr. Joseph Beach, The Hattons, Brewood, Staffordshire, and Flour Mills, Dudley, Worcestershire, for his pen of Ewes, aged 1 year 2 months and 1 week. Bred by himself.

OXFORD DOWN.

Class 39.—For the best Yearling Ram, 10*l.* Second ditto, 5*l.* Three entries.

First Prize awarded to Mr. George Wallis, Old Shifford, Bampton,

Farringdon, Oxfordshire, for his Ram, aged 1 year 4 months and 2 weeks. Bred by himself.

CLASS 40.—For the best Ram of any other age, 5*l.* Second ditto, 3*l.* Two entries.

First Prize awarded to Mr. GEORGE WALLIS, Old Shifford, Bampton, Farringdon, Oxfordshire, for his Ram, aged 3 years 4 months and 2 weeks. Bred by himself.

Second Prize awarded to Mr. GEORGE WALLIS, Old Shifford, Bampton, Farringdon, Oxfordshire, for his Ram, aged 2 years 4 months and 2 weeks, Bred by himself.

CLASS 41.—For the best pen of five Yearling Ewes, 10*l.* Second ditto, 5*l.* One entry.

First Prize awarded to Mr. AARON FUTCHER, Fovant, Salisbury, Wilts, for his pen of Ewes, aged 1 year and 4 months. Bred by himself.

SOMERSET AND DORSET HORN.

CLASS 42.—For the best Yearling Ram, 10*l.* Second ditto, 5*l.* Thirteen entries.

First Prize awarded to Mr. THOMAS DANGER, Huntstile, Bridgwater, Somerset, for his Dorset Horn Ram, aged 1 year and 5 months. Bred by himself.

Second Prize awarded to Mr. ALFRED J. PITFIELD, Eype, Bridport, Dorset, for his Dorset Horn Ram, aged 1 year 5 months and 2 weeks. Bred by himself.

Highly Commended.—Mr. HENRY MAYO, Cokers Frome, Dorchester, Dorset, for his Dorset Horn Ram, aged 1 year 4 months 1 week and 5 days. Bred by himself.

Commended.—Mr. HENRY MAYO, Cokers Frome, Dorchester, Dorset, for his Dorset Horn Ram, aged 1 year 5 months 3 weeks and 6 days. Bred by himself.

Mr. FREDERICK BOND, Whitelackington, Ilminster, Somerset, for his Dorset Horn Ram, aged 1 year and 5 months. Bred by himself.

Mr. JAMES WILLIAM JAMES, Mappowder, Blandford, Dorset, for his Dorset Horn Ram, aged 1 year and 5 months. Bred by himself.

CLASS 43.—For the best Ram of any other age, 5*l.* Second ditto, 3*l.* Six entries.

First Prize awarded to Mr. THOMAS DANGER, Huntstile, Bridgwater, Somerset, for his Somerset Horn Ram, aged 3 years and 5 months. Bred by himself.

Second Prize awarded to Mr. THOMAS DANGER, Huntstile, Bridgwater, Somerset, for his Somerset Horn Ram, aged 2 years and 5 months. Bred by himself.

Highly Commended.—Mr. ALFRED J. PITFELD, Eype, Bridport, Dorset, for his Dorset Horn Ram, aged 2 years 5 months and 2 weeks. Bred by himself.

CLASS 44.—For the best Pen of five Yearling Ewes, 10*l.* Second ditto, 5*l.* Three entries.

First Prize awarded to Mr. HENRY MAYO, Cokers Frome, Dorchester, Dorset, for his pen of five Somerset and Dorset Horn Yearling Ewes, aged 1 year 5 months 1 week and 4 days. Bred by himself.

Second Prize awarded to Mr. THOMAS DANGER, Huntstile, Bridgwater, Somerset, for his pen of five Somerset Horn Yearling Ewes, aged 1 year and 5 months. Bred by himself.

Highly Commended.—Mr. HENRY MAYO, Cokers Frome, Dorchester, Dorset, for his pen of five Somerset and Dorset Horn Yearling Ewes, aged 1 year 5 months 3 weeks and 6 days. Bred by himself.

MOUNTAIN.

CLASS 45.—For the best Ram of any age, 10*l*. Second ditto, 5*l*. Four entries.

First Prize awarded to Mr. EDWIN MAUNDER, Heaselly Mill, North Molton, Devon, for his Exmoor Mountain Horn Ram, aged 4 years and 1 month.

Second Prize awarded to Mr. JAMES QUARTLY, West Molland, South Molton, Devon, for his Exmoor Mountain Ram, aged 3 years and 3 months. Bred by himself.

Highly Commended.—Mr. EDWIN MAUNDER, Heaselly Mill, North Molton, Devon, for his Exmoor Mountain Horn Ram, aged 5 years and 1 month. Bred by Mr. John Quartly, West Molland, South Molton, Devon.

CLASS 46.—For the best pen of five Ewes of any age, 5*l*. Second ditto, 3*l*.

No entry.

HORSES.

FOR AGRICULTURAL PURPOSES.

CLASS 47.—For the best Stallion, foaled before 1865, 30*l*. Second ditto, 15*l*. Six entries.

First Prize awarded to Mr. WILLIAM SAINSBURY, Hunt's House, West Lavington, Devizes, for his Dark Grey Stallion (Britain), aged 7 years 1 month and 3 days. Bred by Mr. Gye, Littleton, Trowbridge, Wilts; sire, George the Fourth.

Second Prize awarded to Mr. WILLIAM HENRY GALE, Manor Farm, Burbridge, Marlborough, Wilts, for his Chesnut Stallion (Jupiter), aged 6 years 11 months and 3 weeks. Bred by himself; sire, Mr. Spearing's Lion; dam, Diamond, by Sampson; sire of granddam, Mr. Washbourn's Farmer's Glory.

Highly Commended.—Mr. ROBERT JACOB, Baltonsborough, Glastonbury, Somerset, for his Dark Chesnut Clydesdale Stallion (Bumper), aged 5 years 10 months 3 weeks and 2 days. Bred by Mr. Edwin Brooks, Leamington, Yeovil; sire, Invincible; dam, Smart.

CLASS 48.—For the best Stallion, foaled in 1865, 20*l*. Second ditto, 10*l*. Six entries.

First Prize awarded to Mr. EDWARD GIBBS, Chitterne, Heytesbury, Wilts, for his Roan Stallion (Banker). Bred by himself; sire, Samson; dam, Whitefoot.

Second Prize awarded to Mr. ARTHUR THOMAS NEWMAN, West Dean,

Chichester, Sussex, for his Light Bay Stallion (Young Champion), aged 2 years 3 months and 2 days. Bred by himself; sire, Young Champion; dam, Flower.

Highly Commended.—Mr. EDWARD HOLLAND, M.P., Dumbleton Hall, Evesham, Worcestershire, for his Blue-Roan Stallion, aged 2 years.

CLASS 49.—For the best Mare and Foal, or in Foal, 15*l.* Second ditto, 5*l.* Seven entries.

First Prize awarded to Mr. EDWARD HOLLAND, M.P., Dumbleton Hall, Evesham, Worcestershire, for his Red-Roan Mare (Matchless) aged 14 years, with Foal at foot. Bred by himself; sire, Invincible; dam, Scott.

Second Prize awarded to Mr. JACOB GOLLEDGE, Whaddon Grove, Trowbridge, Wilts, for his Bay Mare, in Foal (Blossom), aged 7 years.

Commended.—Mr. JAMES LUSH, Winterbourne Earls, Salisbury, Wilts, for his Grey Mare and Foal (Sober), aged 7 years. Bred by Mr. Newman, Littleton, Devizes, Wilts; sire, Mr. Fowle's horse.

Mr. A. LAVINGTON, Poulshot Lodge, Devizes, Wilts, for his Brown Mare, aged 7 years and 1 month, with a Chestnut Foal at foot, aged 1 month 2 weeks and 1 day. Bred by himself; sire of Mare, King George; foal by Sampson.

CLASS 50.—For the best pair of Agricultural Horses (Mares or Geldings), foaled before the 1st of January, 1862, having been in the possession of the Exhibitor six months previous to the date of entry, 20*l.* Second ditto, 10*l.* One entry.

First Prize awarded to Mr. FREDERICK LAVINGTON, Chitterne-St.-Mary, Heytesbury, Wilts, for his pair of Roan Agricultural Horses (Pleasant), aged 9 years, and (Trojan), aged 6 years. Bred by himself; dam of Pleasant, Sorrel; dam of Trojan, Violet.

CLASS 51.—For the best pair of Agricultural Horses (Mares or Geldings), foaled after the 1st of January, 1862, having been in possession of the Exhibitor six months previous to the date of entry, 20*l.* Second ditto, 10*l.* Three entries.

First Prize awarded to Mr. EDWARD GIBBS, Chitterne, Heytesbury, Wilts, for his pair of Roan Agricultural Horses, a Mare (Smart) and Gelding (Captain). Bred by himself; sire, Sampson; dam of one, Violet; the other, Gipsy; sire of Gipsy, Lion; sire of Violet, unknown.

Second Prize, awarded to Mr. JAMES GEORGE SIMPKINS, Alton Priors, Marlborough, Wilts, for his pair of Black and Roan Agricultural Horses, a Gelding (Lion), exact age and breeder unknown; and a Mare (Blossom), aged 5 years and 1 month. Bred by himself.

HUNTERS.

CLASS 52.—For the best Mare or Gelding foaled before the 1st of January, 1863, 25*l.* Second ditto, 10*l.* Nine entries.

First Prize awarded to Mr. THOMAS SUTTON, Alwent, Darlington, Durham, for his Chesnut Gelding (Voyageur), aged 8 years. Bred by Mr. John Reynolds, Garristown, Dublin; sire, Jolly Tar; sire of dam, Spencer.

Second Prize awarded to Captain EDWARD NICHOLAS HEYGATE, Buckland, Leominster, Hereford, for his Black Gelding (Mountain Dew), aged 5 years and 58 days. Bred by himself; sire, Era; dam, Whiskey; sire of dam, Whindhound.

Highly Commended.—Mr. ERLYSMAN C. PINCKNEY, Berwick St. James, Salisbury, Wilts, for his Bay Mare (Kathleen), with foal at foot, age and breeder unknown.

Highly Commended.—Mr. WILLIAM PAULL, Puddletown, Dorchester, Dorset, for his Bay Gelding (Plaudit), aged 6 years 1 month and 1 week. Bred by Mr. William Watts, Frampton, Dorchester; sire, a colt by Bay Middleton; dam by Grand Duke.

CLASS 53.—For the best Mare or Gelding foaled in 1863, 25*l.* Second ditto, 10*l.* Four entries.

First Prize awarded to Captain EDWARD NICHOLAS HEYGATE, Buckland, Leominster, Hereford, for his Black Gelding (Denmark), aged 4 years and 57 days. Bred by himself; sire, Era; dam, Whiskey; sire of dam, Whindhound.

Second Prize awarded to Mr. JOHN WOODCOCK, Netherhampton, Salisbury, Wilts, for his Bay Gelding (Head Centre), aged 4 years 1 month and 4 days. Bred by himself; sire, Drogheda; dam, Setebos.

CLASS 54.—For the best Filly or Gelding foaled in 1864, 15*l.* Second ditto, 5*l.* Five entries.

First Prize awarded to Captain EDWARD NICHOLAS HEYGATE, Buckland, Leominster, Hereford, for his Chesnut Filly (Britannia), aged 3 years and 59 days. Bred by himself; sire, Ancient Briton; dam, Whiskey; sire of dam, Whindhound.

Second Prize awarded to Mrs. LOUISA MALCOM, Beechwood, Totton, Hants, for her Chesnut Filly (Sunshine), aged 3 years and 1 month. Bred by herself; sire, Testator, by Sir Hercules; dam Variety by Cadiz; dam, Kef.

Commended.—Mr. ROBERT CANNING, Townsend Manor, Over Wallop, Stockbridge, Hants, for his Dark Chesnut Gelding, aged 3 years 1 month and 2 days. Bred by himself; sire, Don Cossack.

HACKS.

CLASS 55.—For the best Mare or Gelding, not more than six years old, nor exceeding 15 hands high, calculated to carry not less than fifteen stone, 10*l.* Second ditto, 5*l.* No entry.

CLASS 56.—For the best Mare or Gelding, not more than 6 years old, nor exceeding 15 hands high, calculated to carry not less than twelve stone, 10*l.* Second ditto, 5*l.* Six entries.

First Prize awarded to Mr. ROBERT KELMISTER MELSOME, Norton Bavant, Warminster, Wilts, for his Chesnut Filly (Golden Locks), aged 5 years 1 month and 2 days. Bred by Mr. William Trist, Langford Barton, Ugborough, Ivybridge, Devon: sire, Ratan; dam, by Nemo.

Second Prize awarded to Mr. RICHARD WILLIAM MELSOME, Stockton, Heytesbury Wilts., for his Chesnut Gelding (Little Wonder), aged 5 years.

PONIES.

CLASS 57.—For the best Mare or Gelding not exceeding 13 hands high, 10*l.* Five entries.

First Prize awarded to Mr. ROBERT FOOKES, Milton Abbas, Blandford, Dorset, for his Brown Forrester Pony (Bob), aged 4 years. Breeder unknown

PIGS.

LARGE BREED.

CLASS 58.—For the best Boar, above 1 year and not exceeding 2 years old on 1st June, 1867, 5*l*. Second ditto, 3*l*. Three entries.

First Prize awarded to Mr. RICHARD ELMHURST DUCKERING, Northorpe, Kirton Lindsey, Lincoln, for his White Lincolnshire Boar Pig (Dreadnaught), aged 1 year 9 months and 2 weeks. Bred by himself: sire, Cultivator I.; dam, Countess of Leicester; sire of dam, Great Britain.

Second Prize awarded to Mr. RICHARD ELMHURST DUCKERING, Northorpe, Kirton Lindsey, Lincoln, for his White Lincolnshire Boar Pig, (Cultivator III.), aged 1 year 11 months and 3 days. Bred by himself; sire, Cultivator I.; dam, Queen Bess; sire of dam, Victor.

CLASS 59.—For the best Boar, not exceeding 1 year old on 1st June, 1867, 5*l*. Second ditto, 3*l*. Nine entries.

First Prize awarded to Mr. ARTHUR STEWART, Saint Bridge, Gloucester, for his Black and White Boar Pig (Saint Bridge Lad), aged 10 months 1 week and 5 days. Bred by himself; sire, Teddy; dam, Gipsey Girl; sire of dam, Second Duke of Gloucester.

Second Prize awarded to Mr. HEBER HUMFREY, Kingstone Farm, Shrivenham, Berks., for his Black and White Berkshire Boar Pig (Pedigree Chart), aged 11 months 1 week and 3 days. Bred by himself; sire, Souse Genteel; dam, Butter Basket.

Highly Commended.—Mr. ARTHUR STEWART, Saint Bridge, Gloucester, for his Black and White Berkshire Boar Pig (Gipsey Lad), aged 6 months and 30 days. Bred by himself; sire, Teddy; dam, Suckey; sire of dam, Second Duke of Gloucester.

Mr. JOHN KING TOMBS, Langford, Lechlade, Gloucestershire, for his Black and White Berkshire Boar Pig, aged 5 months and 2 weeks. Bred by himself.

Commended.—Mr. WILLIAM HEWER, Sevenhampton, Highworth, Wilts, for his Black with a little White Berkshire Boar Pig, aged 8 months and 3 weeks. Bred by himself; sire, Sir John; dam, Alice; sire of dam, Garibaldi.

CLASS 60.—For the best Breeding Sow in farrow, or that has farrowed within 2 months next preceding the first day of the Exhibition, 5*l*. Second ditto, 3*l*. Eleven entries.

First Prize awarded to Mr. RICHARD ELMHURST DUCKERING, Northorpe, Kirton Lindsey, Lincoln, for his White and Blue-Spotted Sow (Lady Byron), aged 1 year 9 months and 3 weeks. Bred by Mr. J. Byrom, Hazelhead Bone-works, Pennystone, York.

Second Prize awarded to Mr. RICHARD ELMHURST DUCKERING, Northorpe, Kirton Lindsey, Lincoln, for his White Lincolnshire Sow (Princess Royal), aged 2 years 4 months and 1 week. Bred by himself; sire, Cultivator; dam, Queen Bess; sire of dam, Victor.

Highly Commended.—Mr. HEBER HUMFREY, Kingstone Farm, Shrivenham, Berks, for his Black and White Berkshire Breeding Sow, in farrow (Delight), aged 1 year 8 months 2 weeks and 4 days. Bred by himself; sire, Langley; dam, Deficient; sire of dam, New Policy.

Mr. ARTHUR STEWART, Saint Bridge, Gloucester, for his Black and White Berkshire Sow, in farrow (Young Bobtail), aged 10 months 3 weeks and 4 days. Bred by himself; sire, Tom Whiffler; dam, Old Bobtail.

. JAMES D. ALLEN, Tisbury, Salisbury, Wilts, for his Black and White hire Sow (Princess), in farrow, aged 2 years and about 5 months. Bred mself.

nmended.—Mr. HEBER HUMFREY, Kingstone Farm, Shrivenham, Berks, s Black and White Berkshire Breeding Sow, in farrow (Doubtful), aged onths 2 weeks and 2 days. Bred by himself; sire, Souse Genteel.

s 61.—For the best pen of two Breeding Sows, not exceeding months of age on 1st June, 1867, 5*l.* Second ditto, 3*l.* Five itries.

rst Prize awarded to Mr. RICHARD ELMHURST DUCKERING, Northorpe on Lindsey, Lincoln, for his pen of two improved White Lincolnshire ding Sows, aged 6 months 1 week and 2 days. Bred by himself; sire, ivator III.; dam, Queen Bess II.; sire of dam, Victor.

cond Prize awarded to Mr. WILLIAM HEWER, Sevenhampton, Highworth, s, for his pen of two Black with a little White Berkshire Breeding Sows, 8 months and 3 weeks. Bred by himself; sire, Sir John; dam, Alice; of dam, Garibaldi.

ommended.—Mr. ARTHUR STEWART, Saint Bridge, Gloucester, for his pen of Black and White Berkshire Breeding Sows, aged 8 months 3 weeks and 5 . Bred by himself; sire, Tim Whiffler; dam, Aunt Sally.

BERKSHIRE PIGS.

ss 62.—For the best Boar, 5*l.* Eleven entries.

irst Prize awarded to Mr. WILLIAM YELLS, Round Robin Farm, Highworth, s, for his Black and White Berkshire Boar Pig, aged 5 months 3 weeks 6 days. Bred by himself; sire, Champion; dam, Maid of Honour; sire of , King of Newport.

ighly Commended.—Sir WILLIAM THROCKMORTON, Bart., Buckland, Fadon, Berks, for his Black with little White Berkshire Boar Pig (Prince), 1 year. Bred by himself; sire, young Champion; dam, Favourite; sire am, Old Champion.

ommended.—Mr. JAMES RAWLENCE, Bulbridge, Wilton, Salisbury, Wilts, his Black Berkshire Boar Pig, aged 1 year and about 6 months. Bred by self.

Mr. JOHN KING TOMBS, Langford, Lechlade, Gloucestershire, for his Black White Berkshire Boar Pig, aged 5 months and 2 weeks. Bred by himself.

ss 63.—For the best Sow of any age, with pigs or in farrow, 5*l.* econd ditto, 2*l.* 10*s.* Fifteen entries.

irst Prize awarded to Mr. JOHN KING TOMBS, Langford, Lechlade, Glouershire, for his Black and White Berkshire Sow, in farrow, aged 11 months eeks and 6 days. Bred by himself.

econd Prize awarded to the Most Noble the Marquis of AYLESBURY, Home m, Severnake Forest, Marlborough, Wilts, for his Black and White Berke Sow (Forest Queen), aged 10 months 1 week and 2 days. Bred by self.

Highly commended.—Mr. HARRY RIVINGTON, College Farm, Cirencester, ucestershire, for his Black Berkshire Sow (Gipsey Girl), aged 11 months 4 ks and 1 day. Bred by Mr. Joseph Smith, Henley-in-Arden, Warwicke.

Mr. WILLIAM YELLS, Round Robin Farm, Highworth, Wilts, for his ck and White Berkshire Breeding Sow (Maid of Honour), aged 2 years 11

months 3 weeks and 1 day. Bred by himself; sire, King of Newport; dam, Smyrna; sire of dam, Surprise.

Sir WILLIAM THROCKMORTON, Bart., Buckland, Faringdon, Berks, for his Black and White pure Berkshire Breeding Sow (Beauty), in farrow, aged 4 years 10 months and 3 weeks. Bred by himself; sire, Old Champion; sire of dam, Stumptail.

Commended.—Mr. HARRY RIVINGTON, College Farm, Cirencester, Gloucestershire, for his Black Berkshire Sow (Sukey), aged 1 year 10 months and 2 weeks. Bred by himself; sire, Second Duke of Gloucester; dam, Stumpy.

CLASS 64.—For the three best Hilts above 4 and not exceeding 8 months old, and of the same litter, 5*l*. Second ditto, 2*l*. 10*s*. Five entries.

First Prize awarded to Mr. ARTHUR STEWART, Saint Bridge, Gloucester, for his pen of three Black and White Berkshire Breeding Sow Pigs, aged 6 months and 30 days. Bred by himself; sire, Teddy; dam, Suckey; sire of dam, Second Duke of Gloucester.

Second Prize awarded to Mr. WILLIAM YELLS, Round Robin Farm, Highworth, Wilts, for his pen of three Black and White Berkshire Breeding Sow Pigs, aged 8 months. Bred by himself; sire, Champion; dam, Favourite; sire of dam, Dairyman's Pride.

Highly Commended.—The Rev. HENRY G. BAILY, Swindon, Wilts, for his pen of three Black with White Points Berkshire Sow Pigs, aged 7 months. Bred by himself. sire, King Charlie; dam, Exquisite.

SMALL BREED.

CLASS 65—For the best Boar, above 1 year and not exceeding 2 years old on 1st June, 1867, 5*l*. Second ditto, 3*l*. Two entries.

First Prize awarded to Mr. RICHARD ELMHURST DUCKERING, Northorpe Kirton Lindsey, Lincoln, for his White Boar Pig (The Hermit), aged 1 year 4 months and 5 days. Bred by Lord Galway.

Second Prize awarded to Captain RICHARD PELHAM WARREN, Worting House, Basingstoke, Hants, for his White Boar Pig (Champion II.), aged 1 year 5 months 2 weeks and 1 day. Bred by himself; dam, Snow Flake.

CLASS 66.—For the best Boar, not exceeding 1 year old on 1st June, 1867, 5*l*. Second ditto 3*l*. Five entries.

First Prize awarded to Mr. EDMUND COLES, Stone Farm, Yeovil, Somerset, for his Black Essex Boar Pig (Tippler), aged 10 months and 3 weeks. Bred by himself; dam, Queen; sire of dam, Sweep.

Second Prize awarded to Captain RICHARD PELHAM WARREN, Worting House, Basingstoke, Hants, for his White Yorkshire Boar Pig (Challenge), aged 5 months 2 weeks and 5 days. Bred by himself; sire, Champion II.; dam Snow Flake.

Highly Commended.—Mr. EDMUND COLES, Stone Farm, Yeovil, Somerset, for his Black Essex Boar Pig (Black Jack), aged 10 months and 3 weeks. Bred by himself; dam, Queen; sire of dam, Sweep.

Mr. RICHARD ELMHURST DUCKERING, Northorpe, Kirton Lindsey, Lincoln, for his White Boar Pig (Thetlero), aged 7 months. Bred by himself; sire, Galway; dam, Little Queen.

Commended.—The Right Honourable the Earl of RADNOR, Coleshill, Highworth, Wilts, for his White Boar Pig, of the Coleshill breed (Lavington), aged 1 months 1 week and 5 days. Bred by himself; sire, Master Coleshill; dam, Catherine; sire of dam, Salisbury.

CLASS 67.—For the best Breeding Sow in farrow, or that has farrowed within two months next preceding the first day of the Exhibition, 5*l.* Second ditto, 3*l.* Six entries.

First Prize awarded to Mr. RICHARD ELMHURST DUCKERING, Northorpe, Kirton Lindsey, Lincoln, for his White small-breed Breeding Sow (Lilly), aged 1 year and 7 months. Bred by himself.

Second Prize awarded to Mr. EDMUND COLES, Stone Farm, Yeovil, Somerset, for his Black Essex Breeding Sow (Judy), in farrow, aged 1 year 7 months and 1 week. Bred by himself; dam, Beauty; sire of dam, Favourite.

Highly Commended.—Mr. EDMUND COLES, Stone Farm, Yeovil, Somerset, for his Black Essex Breeding Sow (Queen II.), in farrow, aged 2 years 10 months and 2 weeks. Bred by himself, sire, Sweep; dam, Queen I.; sire of dam, Black Prince.

Mr. JAMES D. ALLEN, Tisbury, Salisbury, Wilts, for his improved White Breeding Sow (Snowdrop), in farrow, aged 1 year and about 6 months. Bred by Mr. T. Baring, M.P., Norman Court, Hants.

The Class generally commended.

CLASS 68.—For the best pen of two Breeding Sows, not exceeding 9 months of age on the 1st June, 1867, 5*l.* Second ditto, 3*l.* Three entries.

First Prize awarded to the Right Honourable the Earl of RADNOR, Coleshill, Highworth, Wilts, for his pen of two White Breeding Sows, Coleshill breed, aged 10 months 1 week and 3 days. Bred by himself; sire, Lord Truro; dam, Miss Hereford; sire of dam, Mr. Brown.

Second Prize awarded to Captain RICHARD PELHAM WARREN, Worting House, Basingstoke, Hants, for his pen of two Black Essex Breeding Sows, aged 5 months 3 weeks and 1 day. Bred by himself; sire, Black Prince; dam, Favourite.

Highly Commended.—Mr. RICHARD ELMHURST DUCKERING, Northorpe, Kirton Lindsey, Lincoln, for his pen of two White Breeding Sows, aged 5 months and 1 week. Bred by himself; sire, Galway, dam, Jewel.

Bath and West of England Society,

FOR THE

Encouragement of Agriculture, Arts, Manufactures, and Commerce.

ESTABLISHED 1777.

SALISBURY MEETING, 1867.

Award of Prizes

FOR POULTRY.

STEWARDS.

Mr. ROBERT BRENT, M.D., Woodbury, Exeter.
Mr. R. H. BUSH, Victoria Square, Clifton.

JUDGES.

Mr. E. HEWITT, Birmingham. | Mr. W. B. TEGETMEIER, London.

SPANISH.

CLASS 1.—For the best Cock and Hen, 3*l.* Second ditto, 1*l.* Third ditto, 10*s.*

First Prize, Mr. EDWARD JONES, Berkeley Place, Clifton, Bristol.
Second Prize, Mr. EDWARD JONES, Berkeley Place, Clifton, Bristol.
Third Prize, Mr. R. FULTON, Shandon Cottage, Duke Street, Deptford, Kent.
Commended, the Right Hon. the VISCOUNTESS HOLMESDALE, Linton Park, Staplehurst, Kent.

DORKING (COLOURED).

[illegible] —For the best Cock and Hen, 3*l.* Second ditto, 1*l.* Third ditto, 10*s.*

First Prize, the Right Hon. the VISCOUNTESS HOLMESDALE.
Second Prize, Mr. LIONEL PATTON, Comeytrowe House, near Taunton.
Third Prize, Dr. HEWSON, Coton Hill, Stafford.
Commended, Mr. CHARLES CORK, New Shoreham, Sussex.

DORKING (WHITE).

[illegible] For the [illegible] Cock and Hen, 3*l.* Second ditto, 1*l.*

First Prize, Mr. HENRY LINGWOOD, Barking, Needham Market, Suffolk.
Second Prize, Mr. HENRY LINGWOOD, Barking, Needham Market, Suffolk.

COCHIN CHINA (CINNAMON AND BUFF).

CLASS 4.—For the best Cock and Hen, 3*l.* Second ditto, 1*l.*

First Prize, Mr. GEORGE SHRIMPTON, Leighton-Buzzard.
Second Prize, Mr. J. H. DAWES, Moseley Hall, Birmingham.
Highly commended, Mrs. LLEWELLYN, Court Colman, Bridgend, Glamorganshire; Mr. WILLIAM BAYLISS, Wednesbury Road, Walsall, Staffordshire.
Commended, Mr. F. W. RUST, 1, St. Michael's Place, Hastings.

COCHIN CHINA (BROWN AND PARTRIDGE-FEATHERED).

CLASS 5.—For the best Cock and Hen, 3*l.* Second ditto, 1*l.*

First Prize, Mr. JOSEPH STEPHENS, Walsall, Staffordshire.
Second Prize, Mr. JOSEPH STEPHENS, Walsall, Staffordshire.
Commended, Mr. JOHN K. FOWLER, Prebendal Farms, Aylesbury, Bucks.

COCHIN CHINA (WHITE).

CLASS 6.—For the best Cock and Hen, 3*l.* Second ditto, 1*l.*

First Prize, Mr. F. W. ZURHORST, 17, St. Andrew Street, Dublin.
Second Prize, Mr. H. HOBSON, Walsall, Staffordshire.

BRAHMAPOOTRA FOWL (DARK).

CLASS 7.—For the best Cock and Hen, 3*l.* Second ditto, 1*l.*

First Prize, Mr. R. W. BOYLE, Galtrim House, Bray, Wicklow.
Second Prize, Mr. JOHN K. FOWLER, Prebendal Farms, Aylesbury, Bucks.
Highly commended, Lieut.-Col. Lane, Lily Hill, Bracknell, Berkshire.
Commended, Colonel Stuart Wortley, Rosslyn House, Grove-end Road, London; Lieut.-Col. Lane, Lily Hill, Bracknell, Berkshire.

BRAHMAPOOTRA FOWL (LIGHT).

CLASS 8.—For the best Cock and Hen, 3*l.* Second ditto, 1*l.*

First Prize, Mr. FREDERICK CROOK, Vine Cottage, Forest Hill, Kent.
Second Prize, Mr. H. DOWSETT, Park Farm, Pleshey, near Chelmsford.
Highly commended, Mr. FREDERICK CROOK, Vine Cottage, Forest Hill, Kent.
Commended, Mr. JOHN PARES, Postford, Guildford, Surrey.

GAME (WHITE AND PILES).

CLASS 9.—For the best Cock and Hen, 3*l.* Second ditto, 1*l.*

First Prize, Rev. G. S. CRUWYS, Cruwys Morchard Court, Tiverton, Devon.
Second Prize, Mr. SAMUEL MATTHEW, Stowmarket, Suffolk.
Commended, Rev. FREDERICK WATSON, Messing Hill House, Kelvedon, Essex.

GAME (BLACKS AND BRASSY-WINGED, EXCEPT GREYS).

CLASS 10.—For the best Cock and Hen, 3*l.* Second ditto, 1*l.*

First Prize, Rev. G. S. CRUWYS, Cruwys Morchard Court, Tiverton, Devon.
Second Prize, Mr. JOHN PARES, Postford, Guildford, Surrey.
Commended, Mr. A. D. EDWARDS, Fixby Park, Huddlesfield, Yorkshire; Mr. CHARLES BULPIN, River Side, Bridgwater, Somerset.

GAME (BLACK-BREASTED AND OTHER REDS).

CLASS 11.—For the best Cock and Hen, 3*l.* Second ditto, 1*l.*

First Prize, Mr. SAMUEL MATTHEW, Stowmarket, Suffolk.
Second Prize, Rev. FREDERICK WATSON, Messing Hill House, Kelvedon, Essex.
Highly commended, Mr. HENRY LOE, Appledurcombe, Godshill, Isle of Wight.
Commended, Mr. THOMAS L. MILLS, Orcheston St. Mary, near Devizes, Wilts; Rev. G. S. CRUWYS, Cruwys Morchard Court, Tiverton, Devon.

GAME (DUCKWINGS AND OTHER GREYS AND BLUES).

CLASS 12.—For the best Cock and Hen, 3*l.* Second ditto, 1*l.*

First Prize, Mr. SAMUEL MATTHEW, Stowmarket, Suffolk.
Second Prize, Mr. THOMAS DYSON, Queen's Road, Halifax, Yorkshire.
Commended, Rev. G. S. CRUWYS, Cruwys Morchard Court, Tiverton, Devon.

HAMBURGH (GOLDEN PENCILLED).

CLASS 13.—For the best Cock and Hen, 3*l.* Second ditto, 1*l.*

First Prize, Mr. FRANCIS PITTIS, Jun., Newport House, Newport, Isle of Wight.
Second Prize, Mr. FRANCIS PITTIS, Jun., Newport House, Newport, Isle of Wight.
Highly commended, Mr. SAMUEL ONLEY, 30, Winchcombe Place, Cheltenham.

HAMBURGH (SILVER PENCILLED).

CLASS 14.—For the best Cock and Hen, 3*l.* Second ditto, 1*l.*

First Prize, Mr. HENRY PICKLES, Earby, Skipton, Yorkshire.
Second Prize, Mr. HENRY BELDON, Goitstock, Bingley, Yorkshire.

HAMBURGH (GOLDEN SPANGLED).

CLASS 15.—For the best Cock and Hen, 3*l.* Second ditto, 1*l.*

First Prize, Mr. ISAIAH DAVIES, Bull-street, Harborne, near Birmingham.
Second Prize, Messrs. Samuel and Robert Ashton, Mottram, Cheshire.
Highly Commended, Mr. W. A. HYDE, Prospect Cottage, Ashton-under-Lyne, Lancashire.
Commended, Mr. NATHAN MARLOR, Denton, near Manchester.

HAMBURGH (SILVER SPANGLED).

CLASS 16.—For the best Cock and Hen, 3*l.* Second ditto, 1*l.*

First Prize, Mr. HENRY BELDON, Goitstock, Bingley, Yorkshire.
Second Prize, Mr. A. K. WOOD, King's Mill, Castle Donington, near Derby.
Highly commended, Mrs. PETTAT, Ashe Rectory, Overton, Hampshire.

POLISH FOWL (BLACK, WITH WHITE CRESTS).

CLASS 17.—For the best Cock and Hen, 2*l.* Second ditto, 1*l.*

First Prize, Mr. HENRY BELDON, Goitstock, Bingley, Yorkshire.

POLISH FOWL (GOLDEN).

CLASS 18.—For the best Cock and Hen, 2*l.* Second ditto, 1*l.*

First Prize, Mr. HENRY BELDON, Goitstock, Bingley, Yorkshire.
Second Prize, Mrs. PETTAT, Ashe Rectory, Overton, Hampshire.
Commended, Mrs. PETTAT, Ashe Rectory, Overton, Hampshire.

POLISH FOWL (SILVER).

CLASS 19.—For the best Cock and Hen, 2*l.* Second ditto, 1*l.*

First Prize, Mr. HENRY BELDON, Goitstock, Bingley, Yorkshire.
Second Prize, Mr. GEORGE C. ADKINS, The Lightwoods, near Birmingham.
Commended, Mr. GEORGE C. ADKINS, The Lightwoods, near Birmingham; Mr. JOSEPH HINTON, Hinton, near Bath.

MALAY FOWL.

CLASS 20.—For the best Cock and Hen, 2*l.* Second ditto, 1*l.*

First Prize, Mr. JOSEPH HINTON, Hinton, near Bath.

ANY OTHER DISTINCT VARIETY.

CLASS 21.—For the best Cock and Hen, 3*l.* Second ditto, 1*l.* Third ditto, 10*s.*

First Prize, Colonel STUART WORTLEY, Rosslyn House, Grove-end Road, London.
Second Prize, Rev. D. B. BINNEY, The Elms, Shirley, Southampton.
(Extra) Second Prize, Mr. J. C. PHAIR, 10, Wesh Street, Southsea, Hants.
Third Prize, Mr. SYDNEY A. WYLLIE, Hampton Villa, East Moulsey, Surrey.
(Extra) Third Prize, Mr. SYDNEY A. WYLLIE, Hampton Villa, East Moulsey, Surrey.
(Extra) Third Prize, Miss SELINA H. NORTHCOTE, Upton Pynes, near Exeter.
Highly commended, Colonel STUART WORTLEY, Rosslyn House, Grove-end Road, London; Mr. J. C. PHAIR, 10, Wesh Street, Southsea, Hants; Mr. John K. FOWLER, Prebendal Farms, Aylesbury, Bucks.
Commended, Mr. J. PINCKNEY, Manor House, Durnford, Salisbury; Mr. J. H. AMORY, Bolham, Tiverton, North Devon; Mr. JAMES C. COOPER, Cooper Hill, County Limerick, Ireland; Mr. J. W. Harrison, Broad Street, Spalding, Lincolnshire; Mr. J. C. COOPER, Cooper Hill, County Limerick, Ireland; Miss SELINA H. NORTHCOTE, Upper Pynes, near Exeter.

CLASSES FOR SINGLE COCKS.

SPANISH.

CLASS 22.—First Prize, 2*l.* Second ditto, 1*l.*

Second Prize, Mr. JOHN LANGDON, Sherborne, Dorset.

DORKING.

CLASS 23.—First Prize, 2*l.* Second ditto, 1*l.*

First Prize, Mr. J. W. HARRISON, Broad Street, Spalding.
Second Prize, Mr. H. DOWSETT, Park Farm, Pleshy, near Chelmsford.

COCHIN-CHINA.

CLASS 24.—First Prize, 2*l.* Second ditto, 1*l.*

First Prize, Mr. HOWARD MAPPLEBECK, Woodfield, Moseley, Birmingham.
Second Prize, Mr. J. H. DAWES, Moseley Hall, Birmingham.
Highly commended, Mr. SAMUEL ONLEY, 30, Winchcombe Place, Cheltenham; Mr. RICHARD BARRETT, Stroud, Gloucestershire; Mr. JAMES CATTELL, Lime Villa, Bristol Road, Birmingham.
Commended, Mr. EDWARD PIGEON, Lympstone, near Exeter; Mr. JOHN K. FOWLER, Prebendal Farms, Aylesbury, Bucks.

BRAHMAPOOTRA.

CLASS 25.—First Prize, 2*l.* Second ditto, 1*l.*

First Prize, Mr. R. W. BOYLE, Galtrim House, Bray, Wicklow, Ireland.
Second Prize, Mr. GEORGE MEARES, Thornhill, Bitterne, near Southampton.
Commended, Mr. JOHN K. FOWLER, Prebendal Farms, Aylesbury, Bucks.

GAME.

CLASS 26.—First Prize, 2*l.* Second ditto, 1*l.*

First Prize, Rev. A. G. BROOKE, Ruyton Eleven Towns, Salop.
Second Prize, Mr. SAMUEL MATTHEW, Stowmarket, Suffolk.
Highly commended, Mr. SIDNEY DUPE, Evercreech, Bath; Rev. G. S. CRUWYS, Cruwys Morchard Court, Tiverton, Devon.

ANY OTHER DISTINCT VARIETY.

CLASS 27.—First Prize, 2*l.* Second ditto, 1*l.*

First Prize, Mr. JOSEPH HINTON, Hinton, near Bath.
Second Prize, Mr. J. PINCKNEY, Manor House, Great Durnford, Salisbury.
Highly commended, Mr. FRANCIS PITTIS, Jun., Newport House, Newport, Isle of Wight.

GUINEA FOWLS.

CLASS 28.—For the best Cock and Hen, 2*l.* Second ditto, 1*l.*

First Prize, Miss SELINA H. NORTHCOTE, Upton Pynes, near Exeter.
Second Prize, Mr. THOMAS C. HARRISON, Beverley Road, Hull.

DUCKS (WHITE AYLESBURY).

CLASS 29.—For the best Drake and Duck, 2*l.* Second ditto, 1*l.*

First Prize, Mr. JOHN K. FOWLER, Prebendal Farms, Aylesbury, Bucks.
Second Prize, Mr. JOHN K. FOWLER, Prebendal Farms, Aylesbury, Bucks.
Highly commended, Mrs. L. M. SQUAREY, Odstock, Salisbury.
Commended, Mr. H. DOWSETT, Park Farm, Pleshey, near Chelmsford.

DUCKS (ROUEN).

CLASS 30.—For the best Drake and Duck, 2*l.* Second ditto, 1*l.*

First Prize, Mr. GEORGE NEATE HULBERT, Perrott's Brook, Cirencester.
Second Prize, Mr. GEORGE NEATE HULBERT, Perrott's Brook, Cirencester.
Highly commended, Mr. J. W. HARRISON, Broad Street, Spalding; Mr. H. DOWSETT, Park Parm, Pleshey, near Chelmsford.
Commended, Mr. CHARLES EDWARDS, The Grove, Wrington, Somerset.

DUCKS, ANY OTHER VARIETY.

CLASS 31.—For the best Drake and Duck, 2*l.* Second ditto, 1*l.*

First Prize, Mr. THOMAS C. HARRISON, Beverley Road, Hull.
Second Prize, Mr. THOMAS C. HARRISON, Beverley Road, Hull.
(Extra) Third Prize, Mr. W. PINCKNEY, Salisbury.
Commended, Mr. J. H. AMORY, Bolham House, Tiverton; Mr. W. CORBIN FINCH, Clayland House, Salisbury.

GEESE.

CLASS 32.—For the best Gander and Goose, 2*l.* Second ditto, 1*l.*

First Prize, Mr. JOHN K. FOWLER, Prebendal Farms, Aylesbury.
Second Prize, Mr. LIONEL PATTON, Comeytrowe House, near Taunton.
Highly commended, Mr. JAMES C. COOPER, Cooper Hill, County Limerick, Ireland; Mr. LIONEL PATTON.
Commended, Mr. JAMES D. ALLEN, Tisbury, Wilts.

TURKEYS.

CLASS 33.—For the best Cock and Hen, 2*l.* Second ditto, 1*l.*

First Prize, Mr. JAMES C. COOPER, Cooper Hill, County Limerick, Ireland.
Second Prize, Captain WARREN, Worting House, Basingstoke.

BANTAMS (GOLD OR SILVER-LACED).

CLASS 34.—For the best Cock and Hen, 2*l.* Second ditto, 1*l.*

First Prize, Mrs. PETTAT, Ashe Rectory, Overton, Hampshire.
Second Prize, Messrs. SAMUEL and ROBERT ASHTON, Mottram, Cheshire.

BANTAMS (WHITE OR BLACK).

CLASS 35.—For the best Cock and Hen, 2*l.* Second ditto, 1*l.*

First Prize, Mr. NATHAN MARLOR, Denton, near Manchester.
Second Prize, Mr. J. R. JESSOP, Beverley Road, Hull.
Highly commended, Miss KATE CHARLTON, Chapelthorpe, near Wakefield.
Commended, Mrs. FLORENCE HUSSEY FREKE, Hannington Hall, Highworth, Wilts; Ditto, ditto; Messrs. SAMUEL and ROBERT ASHTON, Mottram, Cheshire; Rev. P. W. STORY, Charwelton House, Daventry, Northamptonshire.

BANTAMS (GAME).

CLASS 36.—For the best Cock and Hen, 2*l.* Second ditto, 1*l.*

First Prize, Mr. ALFRED IVON ROBINSON, 55, Nile Street, Sunderland, Durham.
Second Prize, Mr. FRANCIS PITTIS, Jun., Newport House, Newport, Isle of Wight.
Third Prize, Mr. THOMAS DYSON, Queen's Road, Halifax.
Commended, Mr. T. H. WYNDHAM, Dinton House, near Salisbury; Mr. SAMUEL LANG, Jun., Gratwicke Hall, Barrow, near Bristol; Mr. JOHN K. FOWLER, Prebendal Farms, Aylesbury; Mr. EDWARD SHEERMAN, High Street, Chelmsford, Essex.

PIGEONS.

CARRIERS (Blue or Silver).

Class 37.—First Prize, 1*l.* Second ditto, 10*s.*

First Prize, Mr. Robert Fulton, Shandon Cottage, Duke Street, Deptford, Kent.

Second Prize, Mr. John Christopher Ord, 105, Lupus Street, Pimlico, London.

CARRIERS (any Colour except Blue or Silver).

Class 38.—For the best Cock and Hen, 1*l.* Second ditto, 10*s.*

First Prize, Mr. Robert Fulton, Shandon Cottage, Duke Street, Deptford, Kent.

Second Prize, Mr. Robert Fulton, Shandon Cottage, Duke Street, Deptford, Kent.

(Extra) Second Prize, Mr. J. W. Harrison, Broad Street, Spalding, Lincolnshire.

TUMBLERS (Almond).

Class 39.—For the best Cock and Hen, 1*l.* Second ditto, 10*s.*

First Prize, Mr. Robert Fulton, Shandon Cottage, Duke Street, Deptford, Kent.

Second Prize, Mr. James Ford, 6, Monkwell Street, London.

Highly commended, Mr. James Ford, 6, Monkwell Street, London; Mr. J. E. Breward, High Street, Coventry.

Commended, Mr. Robert Fulton, Shandon Cottage, Duke Street, Deptford, Kent; Ditto, ditto; Mr. Henry Yardley, Market Hall, Birmingham.

TUMBLERS, ANY OTHER VARIETY.

Class 40.—For the best Cock and Hen, 1*l.* Second ditto, 10*s.*

First Prize, Mr. R. Fulton, Shandon Cottage, Duke Street, Deptford, Kent.

Second Prize, Mr. Henry Yardley, Market Hall, Birmingham.

Commended, Mr. R. Fulton, Shandon Cottage, Duke Street, Deptford, Kent; Mr. F. Mills, Orcheston-St.-Mary, Wilts.

POUTERS.

Class 41.—For the best Cock and Hen, 1*l.* Second ditto, 10*s.*

First Prize, Mr. R. Fulton, Shandon Cottage, Duke Street, Deptford, Kent.

Second Prize, Mr. R. Fulton, Shandon Cottage, Duke Street, Deptford, Kent.

Highly commended, Mr. R. Fulton, Shandon Cottage, Duke Street, Deptford, Kent.

Commended, Mr. John Gould, [illegible] Priory Farm, Taunton; Mr J. E. Breward, [illegible] Street, Coventry.

RUNTS.

[illegible] the best Cock and Hen, 1*l.* Second ditto, 10*s.*

[illegible] Mr. Henry Yardley, Market Hall, Birmingham.

JACOBINES.

CLASS 43.—For the best Cock and Hen, 1*l.* Second ditto, 10*s.*

First Prize, Mr. CHARLES BULPIN, River Side, Bridgwater.
Second Prize, Rev. FREDERICK WATSON, Messing Hill House, Kelvedon, Essex.

FANTAILS.

CLASS 44.—For the best Cock and Hen, 1*l.* Second ditto, 10*s.*

First Prize, Mr. SYDNEY A. WYLLIE, Hampton Villa, East Moulsey, Surrey.
Second Prize, Mr. HENRY YARDLEY, Market Hall, Birmingham.
Highly commended, Mr. HENRY YARDLEY, Market Hall, Birmingham.
Commended, Miss JULIA MILWARD, Newton St. Loe, Bath.

OWLS.

CLASS 45.—For the best Cock and Hen, 1*l.* Second ditto, 10*s.*

First Prize, Mr. SIDNEY A. WYLLIE, Hampton Villa, East Moulsey, Surrey.
Second Prize, Mr. C. BULPIN, River Side, Bridgwater.

TRUMPETERS.

CLASS 46.—For the best Cock and Hen, 1*l.* Second ditto, 10*s.*

First Prize, Mr. CHARLES BULPIN, River Side, Bridgwater.
Second Prize, Mr. CHARLES BULPIN, River Side, Bridgwater.

BARBES.

CLASS 47.—For the best Cock and Hen, 1*l.* Second ditto, 10*s.*

First Prize, Mr. R. FULTON, Shandon Cottage, Duke Street, Deptford, Kent.
Second Prize, Mr. SIDNEY DUPE, Evercreech, Bath.

TURBITS.

CLASS 48.—For the best Cock and Hen, 1*l.* Second ditto, 10*s.*

First Prize, Rev. FREDERICK WATSON, Messing Hill House, Kelvedon, Essex.
Second Prize, Mr. CHARLES BULPIN, River Side, Bridgwater.
Highly commended, Mr. HENRY YARDLEY, Market Hall, Birmingham.

NUNS.

CLASS 49.—For the best Cock and Hen, 1*l.* Second ditto, 10*s.*

First Prize, Mr. CHARLES BULPIN, River Side, Bridgwater.
Second Prize, Mr. CHARLES BULPIN, River Side, Bridgwater.

DRAGOONS.

CLASS 50.—For the best Cock and Hen, 1*l.* Second ditto, 10*s.*

First Prize, Mr. HENRY YARDLEY, Market Hall, Birmingham.
Second Prize, Mr. EDWARD PIGEON, Lympstone, near Exeter.
Highly commended, Mr. EDWARD PIGEON, Lympstone, Exeter; Mr. EDWARD PIGEON, Lympstone, near Exeter.

ARCHANGELS.

CLASS 51.—For the best Cock and Hen, 1*l.* Second ditto, 10*s.*

First Prize, Mr. CHARLES BULPIN, River Side, Bridgwater.
Second Prize, Mr. HENRY YARDLEY, Market Hall, Birmingham.

ANY OTHER NEW OR DISTINCT VARIETY.

CLASS 52.—For the best Cock and Hen, 1*l.* Second ditto, 10*s.*

First Prize, Mr. HENRY YARDLEY, Market Hall, Birmingham.
Second Prize, Mr. FRANCIS BROEMEL, 2, Church Grove, Ladywell, Kent.
(Extra) Second Prize, Mr. FRANCIS BROEMEL, 2, Church Grove, Ladywell, Kent.
Highly commended, Mr. FRANCIS BROEMEL, 2, Church Grove, Ladywell, Kent; Mr. FRANCIS BROEMEL, 2, Church Grove, Ladywell, Kent.
Commended, Mr. HENRY YARDLEY, Market Hall, Birmingham; Ditto, ditto; Mr. HARRY SNUSHALL, Pulverloft Hall, Gedney, Lincolnshire.

***** This Prize Sheet is issued conditionally.**

Bath and West of England Society,

FOR THE

Encouragement of Agriculture, Arts, Manufactures, and Commerce.

ESTABLISHED 1777.

PATRON.

HIS ROYAL HIGHNESS THE PRINCE OF WALES, K.G.

PRESIDENT

FOR 1867-68,

SIR J. T. B. DUCKWORTH, BART.

PRIZES OFFERED FOR STOCK, &c.,

AT THE MEETING OF 1868,

TO BE HELD AT

FALMOUTH,

COMMENCING ON MONDAY THE 1ST DAY OF JUNE.

N.B.—*All entries must be made, the Certificates properly filled up, signed, and returned to the Secretary on or before the 14th of April.*

Prizes for Cattle, Sheep, Horses, and Pigs.

CATTLE.

DEVON.

	Prizes.
CLASS 1.—For the best Bull, exceeding two and not exceeding four years old on the 1st June, 1868	£25
Second ditto	10
CLASS 2.—For the best Bull, not exceeding two years old on 1st June, 1868	20
Second ditto	10
CLASS 3.—For the best Cow in-Calf (or if in-Milk, having had a Calf within six months next preceding the 1st day of June, 1868)	15
Second ditto	10

	Prizes.
CLASS 4.—For the best Heifer in-Calf (or if in-Milk, having had a Calf within six months next preceding the first day of the exhibition), not exceeding three years old on 1st June, 1868	15
Second ditto	10
CLASS 5.—For the best Heifer, not exceeding two years old on 1st June, 1868	10
Second ditto	5

SHORT-HORN.

CLASS 6.—For the best Bull, exceeding two and not exceeding four years old on 1st June, 1868	£25
Second ditto	10
CLASS 7.—For the best Bull, not exceeding two years old on 1st June, 1868	20
Second ditto	10
CLASS 8.—For the best Cow in-Calf (or if in-Milk, having had a Calf within six months next preceding the 1st day of June, 1868)	15
Second ditto	10
CLASS 9.—For the best Heifer in-Calf (or if in-Milk, having had a Calf within six months next preceding the first day of the exhibition), not exceeding three years old on 1st June, 1868	15
Second ditto	10
CLASS 10.—For the best Heifer, not exceeding two years old on 1st June, 1868	10
Second ditto	5

HEREFORD.

CLASS 11.—For the best Bull, exceeding two and not exceeding four years old on the 1st June, 1868	£25
Second ditto	10
CLASS 12.—For the best Bull, not exceeding two years old on the 1st June, 1868	20
Second ditto	10
[illegible] —For the best Cow in-Calf (or if in-Milk, having had a Calf within six months next preceding the 1st day of June, 1868)	15
Second ditto	10
[illegible] For the best Heifer in-Calf (or if in-Milk, having had a Calf within six months next preceding the first day of the exhibition), not exceeding three years old on 1st June, 1868	15
Second ditto	10
5 [illegible] the best Heifer not exceeding two years old on the 1st [illegible]	10
[illegible]	5

SHEEP.

LEICESTER.

	Prizes.
CLASS 16.—For the best Yearling Ram	£12
Second ditto	6
CLASS 17.—For the best Ram of any other age	5
Second ditto	3
CLASS 18.—For the best pen of five Yearling Ewes	10
Second ditto	5

COTSWOLD.

CLASS 19.—For the best Yearling Ram	£12
Second ditto	6
CLASS 20.—For the best Ram of any other age	5
Second ditto	3
CLASS 21.—For the best pen of five Yearling Ewes	10
Second ditto	5

SOUTHDOWN.

CLASS 22.—For the best Yearling Ram	£12
Second ditto	6
CLASS 23.—For the best Ram of any other age	5
Second ditto	3
CLASS 24.—For the best pen of five Yearling Ewes	10
Second ditto	5

HAMPSHIRE DOWN.

CLASS 25.—For the best Yearling Ram	£12
Second ditto	6
CLASS 26.—For the best Ram of any other age	5
Second ditto	3
CLASS 27.—For the best pen of five Yearling Ewes	10
Second ditto	5

OTHER DOWN.

CLASS 28.—For the best Yearling Ram	£12
Second ditto	6
CLASS 29.—For the best Ram of any other age	5
Second ditto	3
CLASS 30.—For the best pen of five Yearling Ewes	10
Second ditto	5

SOMERSET AND DORSET HORN.

CLASS 31.—For the best Yearling Ram	£12
Second ditto	6
CLASS 32.—For the best Ram of any other age	5
Second ditto	3
CLASS 33.—For the best pen of five Yearling Ewes	10
Second ditto	5

EXMOOR AND OTHER HORNED MOUNTAIN
(In their Wool).

	Prizes.
CLASS 34.—For the best Ram of any age	£10
Second ditto	5
CLASS 35.—For the best pen of five Ewes of any age	5
Second ditto	3

DARTMOOR AND OTHER MOOR
(In their Wool),

Not qualified to compete in Classes 34 *and* 35.

CLASS 36.—For the best Ram of any age	£10
Second ditto	5
CLASS 37.—For the best pen of five Ewes of any age	5
Second ditto	3

HORSES.

FOR AGRICULTURAL PURPOSES.

CLASS 38.—For the best Stallion, foaled before 1866	£25
Second ditto	15
CLASS 39.—For the best Stallion, foaled in 1866	20
Second ditto	10
CLASS 40.—For the best Mare and Foal, or in-Foal	15
Second ditto	5
CLASS 41.—For the best Filly, foaled in 1866	10
Second ditto	5

HUNTERS.

CLASS 42.—For the best Mare or Gelding, foaled before the 1st of January, 1864	£25
Second ditto	10
CLASS 43.—For the best Mare or Gelding, foaled in 1864	25
Second ditto	10
CLASS 44.—For the best Filly or Gelding, foaled in 1865	15
Second ditto	5
CLASS [illegible] For the best Filly or Gelding, foaled in 1867	10
Second ditto	5

HACKS.

[illegible] or Gelding, not more than six years old [illegible] exceeding [illegible] hands high calculated to carry not less than twelve [illegible]	£15
[illegible] ditto	5

[illegible]

[illegible] not exceeding 14 hands high	£8
[illegible] ditto	4
For the [illegible] not exceeding 13 hands high	8
Second ditto	4

PIGS.

Large Breed.

	Prizes
Class 49.—For the best Boar, above one year and not exceeding two years old on 1st June, 1868	£5
Second ditto	3
Class 50.—For the best Boar, not exceeding one year old on 1st June, 1868	5
Second ditto	3
Class 51.—For the best Breeding Sow in Farrow, or exhibited with *her* litter	5
Second ditto	3
Class 52.—For the best pen of two Breeding Sows, not exceeding nine months of age on 1st June, 1868	5
Second ditto	3

Small Breed.

Class 53.—For the best Boar, above one year and not exceeding two years old on 1st June, 1868	5
Second ditto	3
Class 54.—For the best Boar, not exceeding one year old on 1st June, 1868	5
Second ditto	3
Class 55.—For the best Breeding Sow in Farrow, or exhibited with *her* litter	5
Second ditto	3
Class 56.—For the best pen of two Breeding Sows, not exceeding nine months of age on 1st June, 1868	5
Second ditto	3

OBSERVE.

☞ In case any description of Stock shall be forbidden by legal authority to be exhibited, or if exhibited shall be required to be slaughtered, the Prizes for such Stock will be withdrawn.

SPECIAL CONDITIONS.

1. The Prizes for Bulls in Classes 1, 6, and 11, will be withheld until a Certificate be delivered to the Secretary of the animal being the Sire of live Calves between January, 1868, and January, 1869.

2. When any Cow or Heifer (not having calved within six months preceding the first day of the exhibition) is entered as "in Calf," any Prize awarded to the same shall be withheld until a Certificate of Calving has been delivered to the Secretary.

3. Every animal having any unsoundness likely to be transmitted to its progeny, shall be disqualified thereby from receiving any prize offered by the Bath and West of England Society.

4. In the cases of Cattle, Sheep, and Pigs, the certificate of the Veterinary Inspector, whether as to age or soundness, shall be required only in cases where the Judges are in doubt, or where a protest shall be delivered to the Secretary before noon on the second day of the Exhibition. The decision of the Inspector in such cases shall be final and conclusive; and in case it shall be against the animal to which a Prize has been awarded, such animal shall be disqualified from receiving such Prize.

5. The Judges in the Horse Classes shall not award a Prize to any animal in such Classes till the Veterinary Inspector of the Society shall have first certified in writing that such animal, if a Horse or Mare, is free from unsoundness likely to be transmitted to its progeny, or if a Gelding, is free from unsoundness (an accident having temporary consequences only excepted).

6. When Mares (not having Foaled within six months previous to the first day of Exhibition) are certified to be in Foal, the Prizes awarded will not be paid until a certificate of Foaling has been delivered to the Secretary.

7. All Foals must be the offspring of the Mare with which they are exhibited for a Prize.

8. The Stallions in Class 38 must be in the Show-yard at 8 oclock, A.M., on Monday the 1st of June, 1868, and remain therein until the Wednesday evening next ensuing. Prizes awarded will not be paid until a certificate from the owner be delivered to the Secretary that the Horse has served at least 20 Mares during the current season.

9. Sheep exhibited for any of the Prizes, except those in Classes 34, 35, 36, and 37, must have been really and fairly shorn bare after the 1st of May, in the year of the Exhibition, and a certificate of the date of such shearing must be forwarded to the Secretary before the 1st of June. Two Inspectors will be appointed by the Council to examine Sheep on their admission to the Show-yard, with instructions to report to the Stewards any cases in which Sheep have not been really and fairly shorn bare. No Sheep shall be trimmed while in the Show-yard.

10. Each lot of Ewes must be of the same Flock.

11. The two Sow Pigs in each pen must be of the same litter.

12. If a litter of Pigs be sent with a Breeding Sow, the Pigs must be the produce of the Sow, and must not exceed two months old.

13. The Society will not be responsible for any accident that may occur through or to any animal exhibited at the Show; and it shall be a condition of entry that each exhibitor shall hold the Society harmless, and indemnify it against any legal proceedings arising from any such accident.

14. The Society will not, in any case, or under any circumstances, hold itself responsible for any loss, damage, or misdelivery of Live Stock or any article exhibited at the Society's Show.

ADJUDICATION OF PRIZES.

THE following Bye-Laws of the Society will regulate the adjudication of the Prizes :—

45. The Judges, in awarding Prizes to Cattle, Sheep, and Pigs, are especially instructed to decide according to the relative merits of the animals for Breeding purposes, and not to take into consideration their present value to the butcher.

46. They are instructed not to award any Prize or Commendation unless the animals exhibited possess sufficient merit.

47. They are also instructed to record the number of any animal or animals which may in their opinion be possessed of sufficient merit to succeed to vacancies caused by disqualification. Animals so placed in a Reserved List shall, in the event of any case of disqualification, succeed to the Prize or Prizes according to their order of merit.

49. The Judges in the Horse Classes shall not award a Prize to any animal in such Classes till the Veterinary Inspector of the Society shall have first certified in writing that such animal, if a Horse or Mare, is free from unsoundness likely to be transmitted to its progeny; or if a gelding, is free from unsoundness (an accident having temporary consequences only excepted).

50. Should any question arise which the Judges may desire to refer to another tribunal, the Stewards of Stock shall assist them in providing a Referee.

General Regulations for the Exhibition of Live Stock, 1868.

1. APPLICATIONS for Certificates must be made to the Secretary (JOSIAH GOODWIN, 4, Terrace Walk, Bath), stating the number of the Class in the Society's Prize-sheet in which it is intended to exhibit. A distinct Certificate for each Animal or lot of Animals must be obtained, and all Certificates are required to be accurately filled up and returned to the Secretary on or before the 14th of April, signed by the Exhibitor or his Agent.

2. Members subscribing 1*l.* or upwards may exhibit an unlimited number of Animals in each Class of Cattle, Sheep, Horses, and Pigs, on payment of 5*s.* on each certificate of entry, together with the amount of subscription, if any, due. Non-Members and Members subscribing less than 20*s.* annually may exhibit for any of the Society's or the Local Premiums, upon payment of a fee of 15*s.* for each certificate of entry.

3. Exhibitors of Horses and Ponies shall pay, in addition to the entrance-fee, the sum of 1*l.* for each horse-box provided for them in the Show-yard.

4. No Animal that has competed in a Fat Stock Class in any Show shall be eligible to compete for the Prizes offered by this Society.

5. The same Animal cannot be entered in two Classes, or compete for more than one Prize.

6. No Animal which has taken a First Prize at any meeting of this Society can compete again in the same Class.

7. Any person entering Stock, and failing to exhibit the same, shall pay a penalty, in the case of Cattle or Horses, of 10*s.*, and of Sheep or Pigs of 5*s.*, for each certificate of entry, or be disqualified for exhibiting in future, unless the non-exhibition of such Stock be caused by the death of the Animal or Animals, contagious disease, or unavoidable injury.

8. In all cases where Prizes are awarded *conditionally*, they will be withheld until the exhibitor shall have proved to the satisfaction of the Council that the conditions have been complied with.

9. All animals exhibited must be *bonâ fide* the property of the exhibitor.

10. The Society, their Officers, and Servants, will not be liable for any errors or mistakes that may happen in placing or penning the Stock, but the Servants in charge of such Stock must see that they are placed or penned according to their entries.

1. The Yard will be open for the reception of Stock and Horses on Friday and Saturday, the 29th and 30th of May, from 7 A.M. to 6 P.M. Horses will also be received from 6 to 8 o'clock on the morning of Monday, the 1st of June. The label sent by the Secretary must be properly affixed to the head each Animal. N.B.—The Horses in Class 38 are not required to be in the yard until 8 o'clock on Monday morning, 1st of June, or to remain longer than 6 o'clock on Wednesday evening, the 3rd of June.

2. Horses can be removed from the yard at night on deposit by the Exhibitor of 1*l.*, which sum will be forfeited if the Horse does not return at 8 A.M. each day during the Exhibition; but except as above no Animal can be permitted to be removed from its place without leave from the Steward [illegible] Department or the Official Superintendent.

13. All Bulls must have a ring or clamp attached to the nose, and all other cattle must be properly secured to the satisfaction of the officers of the Society, on being brought to the gate of the yard, or they will not be admitted.

14. All Stock and all Servants in charge of the same admitted into the Show-yard will be subject to the Orders, Regulations, and Rules of the Society. *Servants only* will be allowed to enter the Show-yard with the Stock.

15. All Stock, except in Class 38, must remain in the Show-yard until after 3 o'clock in the afternoon of Friday the 5th day of June. No Stock can leave the yard till the metal label denoting the number of the animal is given up to the gatekeeper.

NOTE.—Hay, straw, and green food will be delivered to the servants of Exhibitors free of expense upon producing their tickets at the Forage Stores, at 6 P.M., when it will be served out to them, and they must take it to their respective animals.

By order of the Council,

JOSIAH GOODWIN, Secretary,

4, *Terrace Walk, Bath.*

December 1*st*, 1867.

SPECIAL PRIZES

(GIVEN BY WILLIAM MILES, ESQ., OF DIXFIELD, EXETER)

WILL BE OFFERED TO

SMITHS.

For the best Shoeing Smith	£3	3*s.*
Second best	2	2
Third best	1	1

A copy of Mr. Miles's 'Plain Treatise on Horse-Shoeing,' and "a Pair of Models of Horses' Feet properly shod," will also be given to each of the successful Competitors, and to three other Competitors who may be commended by the Judges.

Persons intending to compete for these Prizes must give notice in writing to the Secretary, Josiah Goodwin, 4, Terrace Walk, Bath, on or before the 20th day of May, 1868, and must be at the office of the Official Superintendent, in the Show-yard, on Wednesday Morning, the 3rd day of June, 1868, at 8 o'clock, to receive instructions, and information as to the time and place of Shoeing.

All Competitors must provide their own Tools and a Striker.

The Shoes and Nails to be made and fixed in the Show-yard.

Forges, Coals, and Iron will be provided by the Society.

N.B.—*No man who has won a First Prize in this competition will be eligible to enter.*

Bath and West of England Society

FOR THE

Encouragement of Agriculture, Arts, Manufactures, and Commerce.

ESTABLISHED A.D. 1777.

PATRON.

HIS ROYAL HIGHNESS THE PRINCE OF WALES, K.G.

PRESIDENT

FOR 1867-8,

SIR J. T. B. DUCKWORTH, BART.

Prizes offered

AT THE MEETING OF 1868,

TO BE HELD AT

FALMOUTH,

ON MONDAY THE 1ST, TUESDAY THE 2ND, WEDNESDAY THE 3RD, THURSDAY THE 4TH, AND FRIDAY THE 5TH DAYS OF JUNE.

Prizes for Poultry and Pigeons.

POULTRY.

SPANISH.

Class	£.	s.	d.
1.—For the best Cock and Hen	3	0	0
Second Prize	2	0	0
Third Prize	1	0	0

WORKING—(COLOURED).

For the best [illegible]	3	0	0
Second Prize	2	0	0
Third Prize	1	0	0

WORKING—(WHITE).

For the [illegible]	2	0	0
Second Prize .	1	10	0
Third Prize .	0	10	0

Class	£.	s.	d.
COCHIN-CHINA—(Cinnamon and Buff).			
4.—For the best Cock and Hen	2	0	0
Second Prize	1	10	0
Third Prize	0	10	0
COCHIN-CHINA—(Brown and Partridge-Feathered).			
5.—For the best Cock and Hen	2	0	0
Second Prize	1	10	0
Third Prize	0	10	0
COCHIN CHINA—(White).			
6.—For the best Cock and Hen	2	0	0
Second Prize	1	10	0
Third Prize	0	10	0
BRAHMAPOOTRA FOWL—(Dark).			
7.—For the best Cock and Hen	2	0	0
Second Prize	1	10	0
Third Prize	0	10	0
BRAHMAPOOTRA FOWL—(Light).			
8.—For the best Cock and Hen	2	0	0
Second Prize	1	10	0
Third Prize	0	10	0
GAME—(Black-Breasted and other Reds).			
9.—For the best Cock and Hen	2	0	0
Second Prize	1	10	0
Third Prize	0	10	0
GAME—(Duckwings and other Greys and Blues).			
10.—For the best Cock and Hen	2	0	0
Second Prize	1	10	0
Third Prize	0	10	0
GAME—(any other variety).			
11.—For the best Cock and Hen	2	0	0
Second Prize	1	10	0
Third Prize	0	10	0
HAMBURG—(Golden Pencilled).			
12.—For the best Cock and Hen	2	0	0
Second Prize	1	10	0
Third Prize	0	10	0
HAMBURG—(Silver Pencilled).			
13.—For the best Cock and Hen	2	0	0
Second Prize	1	10	0
Third Prize	0	10	0

Class	£.	s.	d.
HAMBURG—(GOLDEN SPANGLED).			
14.—For the best Cock and Hen	2	0	0
Second Prize	1	10	0
Third Prize	0	10	0
HAMBURG—(SILVER SPANGLED).			
15.—For the best Cock and Hen	2	0	0
Second Prize	1	10	0
Third Prize	0	10	0
POLISH FOWL—(BLACK, WITH WHITE CRESTS).			
16.—For the best Cock and Hen	2	0	0
Second Prize	1	0	0
POLISH FOWL—(GOLDEN).			
17.—For the best Cock and Hen	2	0	0
Second Prize	1	0	0
POLISH FOWL—(SILVER).			
18.—For the best Cock and Hen	2	0	0
Second Prize	1	0	0
FRENCH FOWL—(ANY VARIETY).			
19.—For the best Cock and Hen	2	0	0
Second Prize	1	10	0
Third Prize	0	10	0
ANY OTHER DISTINCT VARIETY—(EXCEPT FRENCH).			
20.—For the best Cock and Hen	3	0	0
Second Prize	1	0	0
Third Prize	0	10	0

CLASSES FOR SINGLE COCKS.

SPANISH

First Prize	2	0	0
Second Prize	1	0	0

DORKING

First Prize	2	0	0
Second Prize ..	1	0	0

GAME FOWL

First Prize ..	2	0	0
Second Prize ..	1	0	0

ass	£.	s.	d.
BRAHMAPOOTRA.			
.—First Prize	2	0	0
Second Prize	1	0	0
GAME.			
.—First Prize	2	0	0
Second Prize	1	0	0
ANY OTHER DISTINCT VARIETY.			
.—First Prize	2	0	0
Second Prize	1	0	0
DUCKS—(White Aylesbury).			
.—For the best Drake and Duck	3	0	0
Second Prize	1	0	0
DUCKS—(Rouen).			
.—For the best Drake and Duck	3	0	0
Second Prize	1	0	0
DUCKS—(any other variety).			
.—For the best Drake and Duck	3	0	0
Second Prize	1	0	0
Third Prize	0	10	0
GEESE.			
.—For the best Gander and Goose	3	0	0
Second Prize	1	0	0
TURKEYS.			
.—For the best Cock and Hen	3	0	0
Second Prize	1	0	0
BANTAMS—(Gold or Silver Laced).			
.—For the best Cock and Hen	2	0	0
Second Prize	1	0	0
BANTAMS—(White or Black).			
.—For the best Cock and Hen	2	0	0
Second Prize	1	0	0
BANTAMS—(Game).			
.—For the best Cock and Hen	2	0	0
Second Prize	1	0	0

PIGEONS.

Carriers (any Colour.)

Class	£.	s.	d.
35.—For the best Cock and Hen	1	0	0
Second Prize	0	10	0

Tumblers (Almond).

36.—For the best Cock and Hen	1	0	0
Second Prize	0	10	0

Tumblers (any other variety).

37.—For the best Cock and Hen	1	0	0
Second Prize	0	10	0

Pouters.

38.—For the best Cock and Hen	1	0	0
Second Prize	0	10	0

Jacobines.

39.—For the best Cock and Hen	1	0	0
Second Prize	0	10	0

Fantails.

40.—For the best Cock and Hen	1	0	0
Second Prize	0	10	0

Owls.

41.—For the best Cock and Hen	1	0	0
Second Prize	0	10	0

Trumpeters.

Class	£.	s.	d
42.—For the best Cock and Hen	1	0	[illegible]
Second Prize	0	10	[illegible]

Barbes.

43.—For the best Cock and Hen	1	0	[illegible]
Second Prize	0	10	[illegible]

Turbits.

44.—For the best Cock and Hen	1	0	[illegible]
Second Prize	0	10	0

Nuns.

45.—For the best Cock and Hen	1	0	0
Second Prize	0	10	0

Dragoons.

46.—For the best Cock and Hen	1	0	0
Second Prize	0	10	0

Archangels.

47.—For the best Cock and Hen	1	0	0
Second Prize	0	10	0

Any other New or Distinct Variety.

48.—For the best Cock and Hen	1	0	0
Second Prize	0	10	0

CONDITIONS AND REGULATIONS.

ALL Exhibitors will be required to pay for coops, food, attendance, &c., as follows:—

Classes 1 to 34 inclusive	5*s.* per pen.
Pigeons	2*s.* 6*d.* per pen.

All carriage must be pre-paid to the Falmouth Station, otherwise the birds will not be received at the Exhibition.

All Certificates of entry must be forwarded to the Secretary, Josiah Goodwin, 4, Terrace Walk, Bath, together with the amount of fees chargeable at the above rates, on or before the 1st of May, 1868, on printed blank forms, which will be furnished by him on application. Certificates of entry will be sent on application. Entries close 1st May.

Exhibitors must state the price, breed, and age of their specimens, on their certificates. Sale *must take place* if the price be offered through the Stewards, and the price of the basket will be included in the purchase money.

High condition, quality, beauty of plumage, purity of race, and uniformity in the markings, combs, and other characteristics, will, in all the classes for Fowl, be taken into consideration by the Judges in a greater degree than mere weight without these distinctions, if the more perfect specimens are at the same time of a fair average size.

The discovery of any wilful mis-statement will exclude the Exhibitor from all future Exhibitions.

The Judges will be empowered to withhold a prize or prizes where specimens are not considered of sufficient merit, or have been clipped, drawn, trimmed, or wrongly entered. *They will, however, have discretion given to them in cases where an Exhibitor shows good pens, although there be no competition.*

The Poultry department will be subject to the rules and regulations of the Society, and its officers.

All the specimens intended for exhibition must be at the Show-yard *before* 10 *o'clock on the evening of Saturday, the* 30*th of May*, and no specimen can be removed before 3 o'clock P.M. on Friday the 5th of June.

All Eggs laid will be destroyed.

Persons entering Poultry and Pigeons, and failing to send the same to the Exhibition, will forfeit the entrance for each pen so left vacant.

It is particularly desired that no pens be sent unless in a perfectly healthy condition.

No Exhibitor or Servant will be allowed into the Tent until the Birds have been judged.

All birds may be claimed at the price put upon them after 3 o'clock on the first day. Application to be made at the Stewards' office, where all sales must be effected, and *payment made when the birds are claimed.*

Exhibitors are particularly requested carefully to examine the Prize Lists and Regulations of the Show, in order to avoid errors in making their entries, as the Society cannot be responsible for wrong descriptions.

It must also be understood that *no alteration can be made in the prices stated on the certificates*, and set forth in the Catalogue; that the specimens must be *sold in pens, and not divided;* and that the persons who have the management of the sales cannot take charge of fowls which are disposed of privately. Attention to these regulations will greatly facilitate the business of the Show, and prevent errors in the accounts and in the despatch of the specimens at the close.

The Stewards pledge themselves to take every care of the Poultry forwarded for competition, but will not in any case be responsible for any unforeseen accident, loss, or mistake that may possibly occur.

In case of death of any Poultry during the time of exhibition, the bird or birds so lost will be sent back for the inspection of the Exhibitor.

A charge of 10 per cent. will be made for all birds sold.

All parties applying to the Secretary for Certificates to enclose a postage stamp.

Labels will be sent to each Exhibitor for each pen entered, on the reverse side of which the Exhibitor must legibly write his name and address for the return journey.

*** *The use of properly-constructed poultry baskets will facilitate the safe removal of the specimens to and from the Exhibition.*

All persons applying for Catalogues must do so direct to Mr. Woodley, Catalogue Contractor, Show Yard, Falmouth, enclosing seven stamps and a directed book wrapper.

Stewards of the Department.

ROBERT BRENT, M.D., Woodbury, near Exeter.
ROBERT HILHOUSE BUSH, 3, Victoria Square, Clifton.

By order of the Council,
JOSIAH GOODWIN, Secretary.

30*th Nov.*, 1867,
4, *Terrace Walk, Bath.*

Bath and West of England Society

FOR THE

Encouragement of Agriculture, Arts, Manufactures, and Commerce.

ESTABLISHED 1777.

PATRON—H.R.H. THE PRINCE OF WALES, K.G.

PRESIDENT, 1867–8.—SIR. J. T. B. DUCKWORTH, BART.

REGULATIONS

OF THE

IMPLEMENT AND MACHINERY DEPARTMENT.

FALMOUTH MEETING,

COMMENCING MONDAY, JUNE 1ST, 1868.

1. Persons desiring to exhibit any Implement, Machine, Carriage, Seeds, or other Articles in this Department, must apply to the Secretary (JOSIAH GOODWIN, 4, Terrace Walk, Bath) for Certificates of Entry and Specification Papers, stating the number of each required. The "Certificate of Entry" and the "Specification Paper" must be duly filled up and delivered to the Secretary, and the fees thereon paid, on or before Tuesday, the 14th day of April, 1868.

2. The Certificate of Entry must state the *extent of space* required by the Exhibitor under the separate heads of "Special Shedding," and "Ordinary Shedding." The Specifications must be headed "Special," or "Ordinary," as the Articles are intended to occupy either description of space.

3. The Fees which each Exhibitor will be required to pay to the Secretary on making his entry are as follow:—

	£.	s.	d.
For Special Shedding (S S), in compartments 20 feet deep and 14 feet wide, for the admission of Thrashing and other Machines of similar height in work. For each compartment	8	10	0

N.B. No charge will be made for space outside the "Special" Shedding which shall be required for the Engines employed to drive the Machines placed therein.

	£. s. d.
For Ordinary Shedding (0 S), 20 feet deep, and 7 feet high at the eaves, per foot run (not less than 10 feet will be allotted)	0 2 0

N.B. In addition to the above, every Exhibitor, not being a Member, or being a Member subscribing less than 1*l.*, will be required to pay 10*s.* Entrance-Fee.

4. All Exhibitors of Machinery *in motion*, worked by steam, will be required to take *Special Shedding*, and must burn coke or smokeless coal. No Steam will be allowed between the lines of Ordinary Shedding, nor will any Machine or Implement be allowed to stand there.

5. Exhibitors shall not sublet any portion of the space allotted to them under a penalty of 40*s.* for each letting, and Exhibitors so offending, together with the party hiring the same, will be liable to expulsion from the Yard.

6. Any Exhibitor who shall enter Machines, Implements, Carriages, Seed, or other Articles in this Department, and fail to exhibit the same, shall pay to the Secretary, Josiah Goodwin, in addition to the Fees for Shedding, a fine of 2½ per cent. on the value of the same, as stated in the specification, up to the sum of 100*l.*, and 1 per cent. for any amount exceeding 100*l.*, unless it shall be proved to the satisfaction of the Stewards of Implements that such failure was caused by unavoidable accident.

7. The Yard will be open for the reception of Articles intended for Exhibition from 7 A.M. to 6 P.M. on Tuesday, May 26; Wednesday, May 27; Thursday, May 28; Friday, May 29; and Saturday, May 30, and not afterwards.

8. Exhibitors must apply for admission-tickets for themselves and servants to the Secretary, not less than 10 days before the first day of the Meeting.

9. Every Article when presented at the gate of the Show-yard must have on it a Ticket bearing in legible characters the name of the Exhibitor, the number of his Shed and Stand, and the number of the Article. Engines and Machines for "Special Shedding," and Implements and other Articles for "Ordinary Shedding," must be conspicuously labelled accordingly. These tickets and labels will be supplied by the Secretary on application. Articles not so ticketed and labelled will be refused admission.

10. All Articles must be arranged in the Sheds in the order in which they are placed in the specification, observing that the numbers must run in the same direction as those of the stands themselves. *No article will on any account be allowed to be placed outside the shedding or within the anchor space.*

11. Exhibitors who shall attempt to force any Article of more than [illegible] feet in height under the "Ordinary Shedding," will incur a

penalty of 40*s.*, and be required instantly to remove the same from the yard. Exhibitors may tie calico or oil-cloth with their names and address thereon, to the *eaves wire* of the shedding, provided the same does not extend beyond their frontage; but they will not be permitted, under any circumstances, to use poles or quartering for this purpose; nor to close any part of their shedding by boards or otherwise without the sanction of the Steward of Implements in the yard.

12. No Article will be allowed to be painted or varnished in the yard, under a penalty of 20*s.*, and instant removal of such article from the yard; and any on which the paint is wet when presented at the gate will be refused admittance.

13. The Council of the Society will not be responsible for the safe keeping of any article exhibited, but will require Exhibitors to take charge of their own property.

14. Exhibitors must provide all articles they may require for exhibiting their Machines in motion in the yard; and their Servants, holding Tickets, will alone be allowed to convey the same to their several Stands.

15. Land and crops will be provided free of charge for the exhibition of Field Implements in work, under such limitations and arrangements as shall be determined by the Field Steward.

16. Exhibitors who have taken Shedding space and paid the fees thereon to the Secretary of the Society, if desirous of showing Implements at work in the field, must give notice to the Secretary on or before the 14th of April, 1868, in the Form prescribed for that purpose. Horses and drivers will be provided for such Exhibitors as shall remit the money with their Shedding fees at the time of entry, at a cost of 7*s.* 6*d.* for each horse per day.—N.B. Exhibitors may provide their own horses and drivers.

17. Exhibitors are to be ready at 9 A.M. on Tuesday the 2nd of June, and Wednesday the 3rd of June, to give out from their stands the Implements (entered as above) for Field-work, and are to be prepared to work the same at intervals from 10 to 3 o'clock on these days, under the direction of the Field Steward. Exhibitors failing to work in compliance with this regulation will be subject to a fine of 10*s.*

18. No articles, except those for Field trial, will be permitted to be removed from the Exhibition till 4 o'clock P.M. on Friday, the 5th of June.

19. No Exhibitor or other person will be allowed to affix any placard or advertisement to any part of the Society's plant or premises, nor will any person be allowed to distribute handbills except in his own shed.

20. Exhibitors will be required to furnish to customers the

articles exhibited by them, and also others of equal quality, material, and manufacture, ordered at the Exhibition, at the prices entered in their specifications.

21. All persons and articles entering the Show-yard and Trial-fields will be subject to the Orders, Rules, and Regulations of the Council, and of the officers appointed by them.

22. All fines shall be recoverable by the Secretary.

N.B. The Yard will be open to the Public from Monday morning the 1st of June, to Friday evening the 5th of June, both inclusive.

By Order of the Council,

JOSIAH GOODWIN, Secretary,

4, *Terrace Walk, Bath.*

1*st December*, 1867.

Bath and West of England Society

FOR THE

Encouragement of Agriculture, Arts, Manufactures, and Commerce.

ESTABLISHED 1777.

PATRON OF THE SOCIETY.

H. R. H. THE PRINCE OF WALES, K.G.

PRESIDENT

(1867-68).

SIR J. T. B. DUCKWORTH, BART.

FALMOUTH MEETING, 1868,

COMMENCING MONDAY, JUNE 1ST,

TERMINATING FRIDAY, JUNE 5TH.

HORTICULTURAL DEPARTMENT

To obviate the objections so often made against the system of exhibiting plants in competition *for Money Prizes*, the Stewards of the Horticultural Department have determined on giving sums of money, varying in amount, not only as a gratuity to Exhibitors' Gardeners, but also to enable them to pay expenses of transit to and from the Society's Exhibition Yard, and to defray the cost of lodgings, board, and other expenses.

All specimens must be staged, in the allotted places, on Monday, June the 1st, by 10 o'clock, A.M.

Specimens must not be removed between the hours of 10 A.M. and 6 P.M. on any day, except the last.

Gardeners are expected to water their own plants, and otherwise attend to them.

All Exhibitors are requested to forward to either of the Stewards, or the Secretary, JOSIAH GOODWIN, 4, Terrace Walk, Bath, before the 20th of May, a description of the Plants proposed to be shown, accompanied by a statement of the space required, and the name of the Gardener who will be in charge of the specimens.

N.B.—The Tent in which the Plants will be exhibited is closed with glass ends, and well ventilated, so as to afford perfect security to the most delicate Flowers.

REV. T. PHILLPOTTS, Porthgwidden, Truro,
W. R. HICKS, Westheath, Bodmin, } *Hon. Stewards.*

By Order of the Council,

JOSIAH GOODWIN, Secretary,

4, *Terrace Walk, Bath.*

December 1*st*, 1868.

Bath and West of England Society,

FOR THE

Encouragement of Agriculture, Arts, Manufactures, and Commerce

ESTABLISHED 1777.

PATRON.
HIS ROYAL HIGHNESS THE PRINCE OF WALES, K.G.

PRESIDENT
(1867-68).
SIR J. T. B. DUCKWORTH, BART.

ARTS DEPARTMENT.

FALMOUTH MEETING,

COMMENCING JUNE 1ST, 1868.

No. 1 SECTION.—For Pictures and other Articles of Interest Lent for Exhibition.

REGULATIONS FOR ARTISTS.

I. Drawings and Sketches sent mounted, and in portfolios, will be put into frames for exhibition free, and should be transmitted for such purpose to Mr. CHARLES THOMAS, carver and gilder, Truro, so as to reach him not later than Tuesday, the 12th day of May, 1868. Exhibitors should distinctly specify in the within Form of Entry * the number of unframed Drawings (and their exact size), which they propose to send, and which come within the regulation.

N.B.—The Committee would, however, impress upon artists the advisability of their framing as many of their works as possible, as the chances of sale are much increased when the frame is included in the price.

II. All pictures left at the following places on or before the 12th day of May next will be exhibited free, and will be conveyed from these depôts to and from the place of exhibition free of charge, namely—

Messrs. Hodge and Co., late Gendall, Cathedral-yard, Exeter.
Mr. Everett, 6, North Parade, Bath.
Mr. Frost, Clare-street, Bristol.
Mr. W. C. Penny, Frome.
Mr. H. M. Custard, Savings Bank, Yeovil.
Mr. Alfred A. Clarke, The Close, Wells.
Mr. J. Beach, Devizes.
Mr. Charles Thomas, carver and gilder, Truro.
Messrs. Cook and Son, 43, Frankfort-street, Plymouth.
Mr. Green, 4, Charles street, Middlesex Hospital, London.

[illegible] following these Regulations.

A commission of 7½ per cent. will be deducted on all pictures sold. The carriage of works sent otherwise than through the above channels must be paid by the exhibitors themselves.

III. No Work of Art will be admitted for exhibition or appear in the Catalogue unless the Notice of Entry be delivered to the Honorary Secretary, as within mentioned.

IV. The Yard will be open for the reception of Works of Art other than those specified in Regulations I. and II., on Thursday, Friday, and Saturday, the 21st, 22nd, and 23rd of May, 1868, and not afterwards.

V. All boxes should contain on the reverse side of the lid the name and address of the owner, and be fastened with screws, and not with nails, and well corded. The name and address should also be written in the inside of each package and folio, and on the back of each picture; and if sent direct to the Exhibition must be addressed to the Exhibitor, by name, "Fine Arts Department, No. 1 Section—Show-yard, Falmouth," where a person will be in attendance to receive, unpack, and afterwards return the pictures according to directions. All packages so sent must be pre-paid. Direction labels may be had on application to the Honorary Secretary.

VI. A written list of Pictures sent for exhibition should in all cases accompany the Pictures sent.

VII. The Society will not be answerable for a loss of, or damage to, any article sent for exhibition.

VIII. After admission to the yard no article that is exhibited will be removable till 4 o'clock P.M. on Friday, the 5th day of June, 1868.

IX. The Fine Arts Department will close each day punctually at 6 o'clock P.M.

X. All persons and articles entering the Show-yard will be subject to the orders, rules, and regulations of the Council, and of the officers appointed by them.

By order,

R. R. M. DAW, Honorary Secretary to the Arts Committee,

13, Bedford Circus, Exeter.

N.B.—Should the artist sending in the accompanying notice of entry have occasion to sell any picture entered, after the date of entry, he will be permitted to substitute a picture of equal size and merit, in the place of the one first entered, upon making application to the Honorary Secretary, R. R. M. Daw, 13, Bedford Circus, Exeter, and filling up a similar notice of entry.

It is contemplated holding an Art Union in connexion with the Exhibition, as in previous years. Prospectuses may be had on application.

Form for Artists.

NOTICE OF ENTRY OF OIL PAINTINGS, WATER-COLOUR DRAWINGS, SKETCHES, AND SCULPTURE.

(*No Entrance Fees.*)

I, , of , near the post town of , in the County of , do give notice of my intention to exhibit framed drawings, unframed ditto, oil paintings, and sculpture, at the Falmouth Meeting of the above Society; and I undertake all risk of damage to the same, and otherwise abide by all the Regulations printed on pp. lxiv. lxv.

Dated the day of , 1868.

Signed , *Exhibitor.*

This Form must be sent by post, or otherwise, so as to reach the Honorary Secretary, R. R. M. DAW, 13, Bedford Circus, Exeter, before the 26th day of April, 1868.

No.	Size of each Picture.	Name and Description of each Picture as desired to appear in the Printed Catalogue.	Selling Price.*	Remarks, if any necessary.
			£. s. d.	

* [illegible] with or without frames.

[illegible] , *Exhibitor.*

[illegible] that full power is vested in the Acting [illegible] exhibit or not to exhibit any or all of the works sent.

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PRESIDENT

FOR 1867-8,

SIR J. T. B. DUCKWORTH, BART.

ARTS DEPARTMENT.

No. 2 SECTION.—**For Art Manufacture.**

FALMOUTH MEETING.

COMMENCING JUNE 1ST, 1868.

A Wooden Building, 9 feet high to the wall-plate, with metal roof, glass lights, and boarded floor, is provided for such objects of Ornamental Art, Art Manufacture, and other articles, as, in the opinion of the Stewards of this Section are suitable for exhibition therein. Full power is vested in the Stewards to refuse the entry of such works as, in their judgment, do not fulfil these requirements.

I, , of , near the post town of , in the County of , do give notice of my desire to exhibit the following Articles, viz.:—(Here give a clear description of their class), subject to the Society's "General Regulations," printed on p. lxx., at the Falmouth Meeting of the above Society; and I undertake to deliver to the Honorary Secretary, R. R. M. DAW, 13, Bedford Circus, Exeter, before the 14th day of April next, Specifications, in duplicate, of such Articles, their Prices, &c., as I wish them to be inserted in the Catalogue.

I also apply for permission to send Attendants to take charge of my stand, and I undertake to furnish their names to

the Hon. Secretary, in writing, one clear week preceding the first day of the Exhibition.

*** Admission for more than one Attendant, except under special circumstances, will not be granted, and the tickets of admission are not transferable.

I also request that the undermentioned space may be allotted to me. And I herewith transmit to the Honorary Secretary, for the use of the Society, £ , in payment of the same, and I undertake that the space, if allotted to me, shall be sufficient to include standing room for myself or assistant without encroaching in any way on the passages reserved for visitors.

*** The space against the walls of the building will be 4 feet wide and 9 feet high, of which there is about 220 feet run, and is termed "Side Space." The space in the centre of the building will be 8 feet wide and 9 feet high, of which there is about 90 feet run, and is termed "Centre Space."

Space required.

	£. s. d.
Side space, 4 feet wide, at 4*s.* per foot run. Not less than 4 feet run, of 4 feet width, which is equal to 16 square feet, will be allotted	— ft. at 4*s.* per ft. run.
Centre space, 8 feet wide, at 8*s.* per foot run. Not less than 2 feet run, of 8 feet width, equal to 16 square feet, will be allotted	— ft. at 8*s.* per ft. run.

Entrance Fee, 10*s.*, payable by Non-Members of the Society in all cases.
(To be struck out if Exhibitor be a member of the Society.)

These charges do not include the cost of counters, which must be erected entirely free of the Society's buildings, and all such counters and fittings must be completed by the Exhibitor by Saturday, May 30th, 1868.

N.B.—This Certificate, and the amount of Fees for the space required, must be sent by post, or otherwise, to the Honorary Secretary, R. R. M. Daw, 3, Bedford Circus, Exeter. The Form of Specification will then be forwarded to the Exhibitor, who must fill up and return the same to the Honorary Secretary before the 14th April 1868.

[illegible] 1868.

[illegible] Exhibitor.

[illegible] must be understood that [illegible] powers vested in the Stewards of this Section to exhibit or not to exhibit any or all of the Works [illegible] that may prove on [illegible] at the Show-yard not to be in con[illegible] with the condition [illegible] this Regulation Paper.

Bath and West of England Society

FOR THE

ouragement of Agriculture, Arts, Manufactures, and Commerce.

ESTABLISHED 1777.

ARTS DEPARTMENT.

FALMOUTH MEETING,

COMMENCING JUNE 1ST, 1868.

No. 2 SECTION.—For Art Manufacture.

orm for Exhibitors in the Arts Department (not being Artists).

ibitors must here set forth the exact size of each counter, glass case, piece furniture, or any other article exceeding 3 feet square, in order to facili-ite the allotment of space by the Stewards of the Department.

ure of object to be Exhibited, irniture, Glass Cases, or other ect exceeding 3 feet square.	Length.	Width.	Height.	General Remarks.

*** Please be very explicit as to space.

GENERAL REGULATIONS

FOR

EXHIBITORS IN THE ART MANUFACTURE DEPARTMENT.

(No. 2 SECTION).

I. No Article will appear in the Catalogue unless the notice of entry and specification thereof, duly filled up in duplicate, be delivered to the Honorary Secretary, and the Fees thereon paid when payable, as within mentioned (14th April).

N.B.—Forms of Notice and Specification may be had of the Honorary Secretary, R. R. M. DAW, 13, Bedford Circus, Exeter.

II. The Yard will be open for the reception of Articles intended for Exhibition from 8 A.M. to 6 P.M. on Tuesday, Wednesday, Thursday, and Friday, the 26th, 27th, 28th, and 29th of May, 1868, and not afterwards.

III. Every package when presented at the gate of the Show-yard must be pre-paid, and must be *addressed to the Exhibitor*, "Art Manufacture Department, No. 2 Section, Show-yard, Falmouth." Articles not so ticketed will be refused admission. Direction labels may be obtained on application to the Honorary Secretary.

IV. No article will be allowed to be painted or varnished in the Yard on pain of forfeiture; and any on which the paint is wet when presented at the gate will be refused admittance.

V. The Society will not be answerable for a loss of, or damage to, any Article exhibited.

VI. After admission to the Yard, no Article that is exhibited will be removable till 4 o'clock, P.M., on Friday, the 5th day of June, 1868.

VII. All Persons and Articles entering the Show-yard will be subject to the Orders, Rules, and Regulations of the Council, and of the Officers appointed by them.

VIII. The Art Manufacture Department will close each day punctually at 6 o'clock P.M.

N.B.—The Yard will be open to Visitors from Monday Morning, the 1st of June, to Friday Evening, the 5th of June, both inclusive. Exhibitors must commence to clear away their goods immediately after the last day of the show, as the building will have to be taken down the following week.

By Order of the Council,

[illegible] M. T[illegible] Honorary Secretary to the Arts Committee,

[illegible] Bedford Circus, Exeter.

[illegible] give Exhibitors some idea of the Class of Articles exhibited [illegible] Manufacture Department (No. 2 Section), it is well to state that subjects from the various Departments of Gold and Silversmiths' Work, Jewellery, Bronzes, Pottery, China, Glass, Papier Mâché, Lamps, Candelabra, Wood Carving, Mediæval Iron Work, Clock and Watch Making, Musical and other Instruments, Cabinet Making, Lace and Embroidery, Marbles, Serpentine, Granite, Ornamental Stone Work, &c., &c., will be admitted for Exhibition, subject to the General Regulations herein set forth.

Bath and West of England Society,

FOR THE

Encouragement of Agriculture, Arts, Manufactures, and Commerce.

ESTABLISHED 1777.

PATRON.

HIS ROYAL HIGHNESS THE PRINCE OF WALES, K.G.

PRESIDENT

FOR 1867-8,

SIR J. T. B. DUCKWORTH, BART.

FALMOUTH MEETING,

COMMENCING JUNE 1ST, 1868.

ARTS DEPARTMENT.

No. 2 SECTION.—For Art Manufacture.

Name of the Exhibitor,
His Address,
Post Town,
Occupation,

} Enter these particulars as you wish them to appear in the Catalogue.

SPECIFICATION OF ARTICLES EXHIBITED.

No. for each Article.	Name and Description of Article.	Selling Price.	Remarks on the Article, if any necessary.
		£. s. d.	

Dated the *day of* , 1868.

Signed , *Exhibitor.*

If there be not space enough on this sheet, the exhibitor may annex as many as requisite, ruled in the same form. Each sheet is to be signed by the exhibitor.

INSTRUCTIONS FOR FILLING UP THIS FORM.

Enter in the first three columns exactly what you wish to appear in the printed Catalogue. Another column is left for remarks not to be printed.

Every article must be entered separately, that is, to a separate number for each article. Articles exhibited together as sets may be entered under one article number.

Give a distinct name to each article or set. Insert, when practicable, the name of the Inventor or Manufacturer; and the use of the article if it be not generally known.

Descriptions of articles, not exceeding 6 lines in print, will be inserted in the Catalogue free. A charge of 6*d.* will be made for every line beyond 6 for any one article.

If the article is not to be sold, assign a value in the money column, and write "not for sale" across the money column just below the value.

Every article not correctly numbered, described, and priced, will be subject to exclusion from the Catalogue.

Draw a line across the page after every article. Keep a memorandum of the numbers.

This List, *with a duplicate*, must be delivered complete to the Honorary Secretary, R. R. M. DAW, 13, Bedford Circus, Exeter, before the 14th April, 1868.

ART UNION

IN CONNEXION WITH THE

BATH AND WEST OF ENGLAND SOCIETY

FOR THE

'ncouragement of Agriculture, Arts, Manufactures, and Commerce.

ESTABLISHED 1777.

[Under the Sanction of Her Majesty's Most Honourable Privy Council.]

PATRON OF THE SOCIETY.

HIS ROYAL HIGHNESS THE PRINCE OF WALES, K.G.

PRESIDENT

(FOR THE YEAR ENDING JUNE, 1868).

SIR J. T. B. DUCKWORTH, BART.

FINE ARTS DEPARTMENT.

FALMOUTH MEETING, 1868.

COMMITTEE:

Chairman—E. S. DREWE, The Grange, Honiton.
Vice-Chairman—T. D. ACLAND, M.P., Sprydoncote, Exeter.

Brent, R., M.D., Woodbury, Exeter.
Carlyon, Rev. W., St. Just Rectory, Cornwall.
Daw, John, Exeter, *Steward.*
Duckworth, Sir J. T. B., Bart., Wear, Exeter.
Enys, F. G., Falmouth.
Falmouth, The Worshipful the Mayor of.
Fox, R., Jun., Falmouth.
Gray, Jonathan, Summerhill, Bath.
Hicks, W. R., Bodmin, *Steward.*
Lang, R., Gratwicke Hall, Barrow Gurney, near Bristol.
Northcote, The Right Hon. Sir S. H., Bart., M.P., Pynes, Exeter.
Phillpotts, Rev. T., Porthgwidden, Truro.
Pitman, Samuel, Manor House, Taunton, *Steward.*
Scott, W. R., Ph.D., Exeter, *Steward.*
Sillifant, John, Coombe, Copplestone, North Devon.
Sillifant, John W., Ottery St. Mary.
Smith, P. P., Truro.
Tweedy, Robert M., Falmouth.
Walrond, J. W., M.P, Bradfield, Collumpton.
Williams, F. M., M.P., Goonvrea, Perranarworthal, Cornwall.

R. R. M. DAW, 13, Bedford Circus, Exeter,
Honorary Secretary.

ART UNION

IN CONNEXION WITH THE

TENTH ANNUAL EXHIBITION OF THE ARTS DEP.

SHARES, ONE SHILLING EACH.

Prizes to be selected from Oil Paintings, Water Colour or othe Sketches, and Sculpture, exhibited for sale at Falmou

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The object of the Art Union is to promote the knowledge a Fine Arts, and to encourage the artists by the sale of their work

The drawing will take place on the Friday of the Exhibiti mencing Monday, June 1st, or such other time as the C appoint.

The whole amount of subscriptions will be devoted to the pur to be selected from the Exhibition.

Tickets may be had on application to the Honorary Secretary, 13, Bedford Circus, Exeter, on receipt of Post Office Order, or for the number of tickets required, or on application to the foll viz. :—

Messrs. Hodges and Co., late Gendall, Cathedral Yard,
Mr. Everitt, 6, North Parade, Bath.
Mr. Frost, Clare Street, Bristol.
Mr. H. M. Custard, Savings' Bank, Yeovil.
Mr. W. C. Penny, Frome.
Mr. Alfred A. Clarke, The Close, Wells.
Mr. J. Beach, Devizes.
Mr. Charles Thomas, carver and gilder, Truro.
Messrs. Cook and Son, 43, Frankfort Street, Plymouth
Mr. Green, 14, Charles Street, Middlesex Hospital, Lo

Bath and West of England Society

FOR THE

ouragement of Agriculture, Arts, Manufactures, and Commerce.

ESTABLISHED 1777.

List of Members.

CORRECTED TO 31ST DECEMBER, 1867, INCLUSIVE.

PATRON—H.R.H. THE PRINCE OF WALES, K.G.

Names thus (*) distinguished are Governors.

Names thus (†) distinguished are Life Members.

* *Members are particularly requested to make the Secretary acquainted with any errors in the names or residences.*

Name.	Residence.	Subscriptions. £.	s.	d.
ALES, HIS ROYAL HIGHNESS HE PRINCE OF	.. ..	. .		
ot, C. Hardcastle . . .	Long Ashton, Bristol	1	1	0
land, Sir P. Palmer, Bart.	Fairfield, Bridgwater	10	0	0
land, Sir T. D., Bart. .	Killerton Park, Exeter. . . .	5	0	0
land, T. Dyke, M.P. . .	Sprydoncote, Exeter . . .	5	0	0
ir, R. Desmond . . .	Moretonhampstead, Devon . .	1	0	0
ms, John	Frittiscombe, Stokenham, Kingsbridge	0	10	0
ms, Thomas	New House, Marden, Hereford .	1	0	0
lington, H. John . . .	Langford Court, near Bristol . .	1	0	0
ison, George Barnabas .	Albert Square, Manchester . .	1	1	0
ey, Henry, Captain . .	Remberton, Collumpton . . .	1	0	0
n, James D.	Pyt House, Tisbury, Wilts . .	1	0	0
n, J. R.	Lyngford House, Taunton . .	1	0	0
len, Ralph Shuttleworth .	Bathampton	2	0	0
ram, W. S.	Stoke St. Mary, Taunton . . .	1	0	0
nes, John	Clevelands, Lyme	. .		
nory, John Heathcoat. .	Tiverton	2	2	0
rews, George James . .	Dorchester	1	1	0
rews, Henry Genge . .	Rimpton, Sherborne	1	0	0
tey, John	Combe Lancey, Sandford, Crediton	0	10	0
robus, Sir Edmund, Bart.	Amesbury Abbey, Wilts. . . .	1	1	0
cher, Edward	Trelaske, Launceston, Cornwall .	. .		

(2)

Name.	Residence.	Subscriptions. £.	s.	d.
Arnold, G.	Harepath, Beaford, North Devon	0	10	0
Arnold, Capt. W.	Iddesleigh, Winkleigh, North Devon	1	1	0
*Ashburton, Lord	The Grange, Alresford, Hants .	5	0	0
Ashby and Jeffery	Stamford, Lincoln	1	0	0
Ashford, John	Loxbear, Tiverton	0	10	0
Ashford, William	Rose Cottage, Woodbury, Exeter	0	10	0
*Ashley, Lord	St. Giles, Cranborne, Dorset . .	2	2	0
*Auckland, Baron, the Right Hon. and Right Rev. Lord Bishop of Bath and Wells.	The Palace, Wells	2	0	0
Babbage, Christopher . . .	Bridgwater	0	10	0
Babbage, William Pitt . . .	Ferris Town, Truro	0	10	0
Badcock, H.	Taunton	1	0	0
Badcock, R. G.	Taunton	1	0	0
Badham, George	Bulmer Tye	1	1	0
Bailey, C. D..	Bath	1	1	0
Bailey, Henry	Walgaston Farm, Berkeley . .	0	10	0
†Baillie, Evan	St. Austin's, Torquay	.	.	.
Baillie, Rev. Alex.	Haine's Hill, Taunton	1	1	0
Bailward, John	Horsington, Wincanton, Somerset	1	1	0
Baily, Rev. H. G.	The Vicarage, Swindon . . .	1	0	0
Baker, Rev. C.	Felisford	1	0	0
Baker, Thomas Henry . . .	Mere Down Farm, Mere . . .	0	10	0
*Baker, Sir Edward B., Bart.	Ranston, Blandford, Dorset . .	2	2	0
Baker, Thomas	Cartuther, Liskeard	0	10	0
Baldwin, John	Luddington, Stratford-on-Avon .	1	0	0
Ball, H. J. Hine.	Hantridge Farm, Taunton . .	1	0	0
Barnard, Thomas	Salisbury	1	1	0
Barrett, E. L.	Tremora House, Trankford, King's County, Ireland	0	10	0
Barrett, Samuel B. C. . . .	Pewsey, Marlborough	1	1	0
Barrett, W.	North Curry, Taunton	1	1	0
Barter, George	Nunnington, Hereford	1	1	0
Barton, C.	Holebrook House, Wincanton .	1	1	0
Barton, W.	West Leigh, near Manchester .	1	0	0
*Bassett, John Francis	Tehidy Park, Redruth	2	0	0
*Bastard, Bald[illegible]n J. [illegible]	Kitley, Yealmpton, Ivybridge .	2	0	0
Bastard, W[illegible]	Slapton, Dartmouth	0	10	0
Bater, R[illegible]	Drake's Farm, Upexe, Silverton, Collumpton	0	10	0
[illegible]	Bickleigh, Tiverton	0	10	0
Bat[illegible]ob.	Umberleigh House, Atherington, near Barnstaple	1	1	0
[illegible]	Longleat, Frome	.	.	.
[illegible]tame C[illegible]	Tavistock	1	0	0
[illegible]ob.	Aldon, [illegible] . .	1	0	0
[illegible]				

Name.	Residence.	Subscriptions. £.	s.	d.
ndale, Joseph . . .	Woodside, Barnet	.	.	
, Joseph	Dudley	1	0	0
, William	Salisbury	1	0	0
ue, C. P.	Dulverton, Somerset	.	.	
, Henry	Newton Abbot	0	10	0
ord, Duke of	Endsleigh, Tavistock	10	10	0
rd, Richard	Warminster	0	10	0
ld, J.	Primley Hill, Paignton, Torquay	1	0	0
J. Williams	Sandby, Gillingham, Wincanton	1	0	0
r, J. Froude	Stockleigh Court, Crediton . .	1	1	0
field, Edmund . . .	Silton Farm, Bourton, Dorset .	0	10	0
tt, Thomas	Morchard Bishop, North Devon .	0	10	0
tt, James	Ingestone, Ross, Hereford . . .	1	0	0
tt, James, Trustees of .	*Journal* Office, Salisbury . . .	1	1	0
tt, William	Banwell, Somerset	1	0	0
n, John	Tavistock	1	0	0
n, Rev. J. P.	Witheridge, Chulmleigh . . .	1	1	0
ll, Edward Hammond .	Heybridge, Maldon	1	0	0
an, John	Colinshayes, Bruton, Somerset .	1	0	0
rd, William H. . . .	Cottington, Sidmouth	1	1	0
, R. L.	Chagford, Exeter	0	10	0
man, W. C.	Wells, Somerset	1	0	0
, W. H.	Dunmore House, Bradninch, Collumpton	1	0	0
, John	Sydling, Dorchester	1	0	0
rd, John	Black-boy Road, Exeter . . .	0	10	0
Thomas	Leicester House, Great Dover Street, London	0	10	6
Charles Lilley . . .	Bourton Grange, Wenlock . .	1	1	0
ngham, C.	Allesford, Minehead	0	10	0
, James	East Looe, Cornwall	1	0	0
more, Rev. R. . . .	Charles Rectory, Southmolton .	1	1	0
Frederick Augustus .	Salisbury	1	0	0
J. Wood	Venne House, Wiveliscombe . .	1	0	0
Thomas	Culsey, Taunton	1	0	0
William	South Petherton	1	0	0
y, Frederick	Leeford, Budleigh Salterton, Devon	1	0	0
rt, John	Willett House, Taunton . . .	1	0	0
r, Alfred	Exeter	1	0	0
r, John	Stockleigh Pomeroy, Crediton .	1	0	0
Deeble	Woolsdon, Antony, Devonport .	1	0	0
Rev. J. T.	Exmouth	1	0	0
A. B.	Orchard Portman, Taunton . .	0	10	0
Frederick	Whitelackington, Ilminster . .	1	0	0
James	Heathfield, Taunton	0	10	0
Thomas	North Petherton, Bridgwater .	0	10	0
ven, the Hon. Rev. J. T.	Lamorran, Probus, Cornwall . .	1	1	0
, John	Hereford	1	1	0
nton-Knight, A. R. . .	Downton Castle, Ludlow . . .	.	.	
, Alfred	Steeple Ashton, Trowbridge . .	0	10	0
, John W.	Ilchester	0	10	0

Name.	Residence.	Subscriptions. £.	s.	d.
Boutcher, William	Grately, Andover, Hants . . .	1	1	0
Bouverie, P. P., jun.	Brymore, Bridgwater	1	0	0
Bowden, John	Ipplepen, Newton Abbot . . .	1	1	0
Bowen, P. W.	Schrawardine Castle, Shrewsbury	1	0	0
Bower, J. B., Jun.	Iwerne, near Blandford	1	0	0
Bowly, Edward	Siddington House, Cirencester .	1	0	0
Bowring, Benjamin	Playsh House, Mark, Highbridge	0	10	0
Bradburn, J. H.	Pipe Place, Lichfield	1	0	0
†Braikenridge, Rev. George Weare	Clevedon, Somerset	.	.	
†Braikenridge, John Herman.	Chew Magna	.	.	
*Bremridge, Richard . . .	Barnstaple (Mayor of, 1859) . .	2	0	0
Brent, Robt., M.D.	Sydney Cottage, Woodbury, Exeter	1	1	0
Bridges, H.	Bridgwater	1	1	0
Brinsmead, Thomas . . .	St. Giles, Great Torrington . .	0	10	0
Bristol Wagon Works Com-Company (Limited) . .	Temple Gate, Bristol	1	0	0
Broad, Thomas Dyke . . .	Bath	1	0	0
Broadmead, S. Palfrey . . .	North Petherton	1	0	0
Brook, W. D.	Bath-Pool Mills, Taunton . . .	0	10	0
Brown and Co.	Bridgwater	1	0	0
Brown and Co.	Salisbury	1	0	0
Brown and May	Wilts Foundry, Devizes . . .	1	0	0
Brown, Solomon	Barton, Landrake, Devonport .	0	10	0
Brown, S. M.	Holton Cottage, Wheatley, Oxon	1	0	0
Browne, J. W.	Uffcott, Swindon	0	10	0
Browne, Thomas Beale . .	Salperton Park, Andoversford .	1	0	0
Browne, Wm.	Cradock Farm, Uffculme, Collumpton.	0	10	0
Bruce, W. A.	Ashley, Chippenham	1	1	0
Bryant, Edwin	Roughmore, Taunton	1	0	0
†Bryce, John	Marley Lodge, Exmouth . . .	.	.	
Buckman, James	Bradford Abbas, Sherborne . .	1	0	0
Bull, Uriah	Mells, Frome	0	10	0
*Buller, J. Francis	Morval, Liskeard, Cornwall . .	2	2	0
Buller, Wentworth Wm. . .	Strete Ralegh House, Whimple, Exeter	1	1	0
*Bullock, George . . .	North Coker, Yeovil	.	.	
*Bullock, George Troyt .	North Coker, Yeovil	.	.	
Bult, James Sl	Kingston, Taunton	0	10	0
Bulteel, Joh	Pamphlete, Ermebridge, Devon .	1	0	0
Burnard, C.	Sutton Road, Plymouth . . .	1	0	0
Burnell, E.	Barwick, Yeovil	0	10	0
Burridge, V	Wellington, Somerset	1	1	0
Bush, Clem	Weston, Bath	1	0	0
Bush, J. D	Bath	.	.	
Bush, T. W	Exeter	1	0	0
Bush, R. B	3, Victoria Square, Clifton . .	1	0	0
Bush, Thon	Castle Hotel, Bath . .	1	0	0
Butle Hon.	Kilmersdon .	1	0	0

Name.	Residence.	Subscriptions. £.	s.	d.
, Clement	Clarence Street, Gloucester . .	1	0	0
'ell, H. B.	Lackham House, Chippenham .	1	0	0
ridge, W. C.	Iron Works, Bristol	1	0	0
George	South Tawton, Devon	1	0	0
, Arthur	Bulland Lodge, Wiveliscombe .	1	1	0
;r, R. Harcourt . . .	Northgate, St. Weonards, Hereford	1	1	0
John	Manor House, Norton Ferris, Warminster	0	10	6
v, Captain G. W. . .	Crowcombe Court, Williton, Taunton	1	0	0
;w, Sir W. P., Bart. . .	Haccombe, Newton Abbot . .	.	.	
', Edmund	Pill, Shepton-Mallett	0	10	0
', John	Steeple Ashton, Trowbridge . .	0	10	0
;w, Thos.	Collipriest, Tiverton	.	.	
;w, W. Pole	Antony, Devonport	2	0	0
ıarvon, Earl of. . . .	High Clere, Newbury	2	0	0
n and Sons	La Belle Sauvage Yard, Ludgate Hill, London	1	1	0
ın, W. H., and Toone, J.	Warminster	1	0	0
r and Co.	238, High Holborn, London . .	1	0	0
;-Wilson, Edw. . . .	Mount Charles, Truro	1	0	0
, Stanley Edward . . .	Follaton House, Totnes . . .	1	0	0
e, R.	Cleeve Court, Yatton, Somerset .	1	0	0
e, Thomas	Banwell, Weston-super-Mare . .	1	1	0
an, Lord	Weston-super-Mare	2	0	0
ıen, John	Bordcaw Farm, Petersfield, Hants	0	10	0
ıpernowne, Rev. Richard	Vineyard, Dartington, Totnes .	1	0	0
non, T.	Wishford, Broadclyst, Exeter .	0	10	0
dler, Thomas	Aldbourne, Hungerford . . .	0	10	0
nan, John	Codford St. Peter, Warminster .	1	0	0
ıb, Thomas	Pitland Farm, near Tavistock .	0	10	0
ch, Professor, A. H. . .	Royal Agricultural College, Cirencester	1	0	0
chill, H.	Morchard Bishop, North Devon .	1	1	0
ıerton, W.	Salisbury	1	1	0
;, Henry	Edgcumbe House, Tavistock . .	1	0	0
;, J. H.	Altwood House, Maidenhead . .	1	1	0
;, Thomas	Bower Henton, Martock . . .	1	0	0
;e, Cyrus	Street, near Glastonbury . . .	0	10	0
;e, C. G.	Cullabine Farm, Dumbleton, Evesham, Worcester	0	10	0
;e, Harry	Cloford, Frome	0	10	0
;e, Jas.	Street, near Glastonbury . . .	0	10	0
;e, R. Hall	Bridwell House, Collumpton . .	1	0	0
rke, T. E.	Tremlet House, Wellington . .	.	.	
ton, Shuttleworth, and Co.	Lincoln	2	2	0
;, Edmund H.	Burford, Shepton-Mallet . . .	1	0	0
;, Robt.	Westholme, Shepton-Mallet . .	1	0	0
'eland, Duke of . . .	Bathwick, Bath	2	0	0
;ord, Lord	Ugbrook, Chudleigh	.	.	
;ord, H. M.	Llantilio, Abergavenny	2	2	0
;)				

Name.	Residence.	Subscriptions. £.	s.	d.
*Clinton, The Lord	Heanton Satchville, Beaford, North Devon	5	0	0
Clothier, Frederick	Hawker's Farm, Bridgwater	0	10	0
Clowes, W.	51, Gloucester Terrace, Hyde Park Gardens	1	1	0
Clowes, George	Duke Street, Stamford Street, London, S., and Surbiton, Surrey	1	1	0
Coate, Henry	Sherborne, Dorset	0	10	0
Cock, John	Clysthydon, Collumpton	0	10	0
Cock, John, jun.	Southmolton	0	10	0
Cockey and Sons	Frome	1	0	0
Coleman and Morton	Chelmsford	1	0	0
Coles, Edmund	Stone Farm, Yeovil	0	10	0
Coles, R.	Norton Bavant, Warminster	1	0	0
Collier, Wm. Frederick	Woodtown, Horrabridge, Devon	1	0	0
Collins, C. R.	Strathculm House, Collumpton	1	0	0
Collins, John	Wonham House, Bampton, Devon	1	1	0
Collins, Rev. C. M.	Trewardale, Bodmin	1	0	0
Collins-Splatt, H.	Brixton House, Plympton	1	1	0
Colthurst, Symons and Co.	Bridgwater	1	0	0
Colthurst, C. T.	Thurloxton, Bridgwater	1	0	0
Colthurst, John	Chew Court, Chewmagna, Somerset	1	0	0
*Combe, R. T.	Earnshill, Curry Rivell, Taunton	2	0	0
Coombs, Thomas	Dorchester	1	1	0
Compton, Thomas	Fisherton De la Mere, Heytesbury	1	0	0
Coniam, Thomas Taylor	Chagford, Devon	1	0	0
Conolly, C. J. T.	Cottles House, Bradford, Wilts	1	1	0
Cook, Nathaniel	Ayshford Court, Burlescombe, Wellington, Somerset	0	10	0
Cook, T. C.	Tiverton, Devon	0	10	0
Cooke, Robert	Harley House, Bath	1	1	0
Coombe, George	Creech St. Michael, Taunton	1	0	0
Coombe, John	West Exe, Tiverton	0	10	0
Cooper, G.	Exeter	0	10	0
Coram, Stephen H.	Trull, Taunton	0	10	0
Cork, John	Tutshill Farm, Abbotsham, Bideford	0	10	0
*Cork and Orrery, The Earl of	Marston, near Frome	2	2	0
Corner, Edward	Woodland, Holford	0	10	0
Corner, J. B.	Longfirth Farm, Wellington, Somerset	1	0	0
Corner, Richard	Torweston, Williton, Taunton	0	10	0
Corner, R.	Fitzhead, Taunton	0	10	0
Corner, W. C.	Woolcotts, King's Brompton, Dulverton	0	10	0
Cornes, James	Barbridge, Nantwich, Cheshire	1	0	0
Cornish, Samuel	Kingsbridge	1	0	0
Cornish, Thos. R.	Bishopsteignton, Teignmouth	0	10	0
Cornish, James	Rixtail, near Chudleigh	0	10	0
Coryton, Colonel Augustus	Pentillie Castle, Plymouth	1	0	0
Cosens, W.	Langdon, Dawlish	1	0	0

Name.	Residence.	Subscriptions. £.	s.	d.
erell, Jacob Henry . .	Bath	. .		
n, R. W.	Barnstaple	0	10	0
on, W. R.	Dean Court, Ashburton . . .	0	10	0
;enay, Lord Viscount, M.P.	Powderham Castle, Exeter . .	1	1	0
;, James	Tolpuddle, Dorchester . . .	1	0	0
g, F.	Timsbury	1	0	0
shay, R. T.	Cyfarthfa Castle, Merthyr Tydvil	1	1	0
in, Henry, jun. . . .	Chulmleigh, North Devon . . .	0	10	0
;er, J. B.	Hainbury House, Ilchester . .	0	10	0
ıman, W.	Paignton, Torquay	0	10	0
ıp, R. W.	Wraye House, Moreton Hampstead	1	0	0
'ys, Rev. G. S. . . .	Cruwys Morchard House, Tiverton	1	1	0
erwell, James	Classey Farm, N. Petherton, Bridgwater	0	10	0
erwell, J. Woodhouse .	Overton Farm, West Monckton .	0	10	0
ing, Elias	Moreton Hampstead, Devon . .	0	10	0
;er, Thomas	Huntstile, Gouthurst, Bridgwater	1	0	0
;er, Fras.	North Parade, Bath	1	1	0
;ey, Rev. Edward . . .	Kenwith Lodge, Abbotsham, Bideford	1	1	0
›y, Josh.	Lychett Matravers, Poole . . .	0	10	0
›y, S.	Bower Henton, Martock . . .	0	10	0
›eny, Lansdowne . . .	Norton House, Pensford . . .	1	1	0
›eny, G. W.	Cote, Westbury-on-Trim . . .	1	1	0
ıvenport, Rev. George .	Foxley, Hereford	. .		
'ey, S. J.	Redruth	. .		
'ey, Richard, M.P. . .	Helston, Cornwall	2	2	0
'ie, Sir H. R.F., Bt., M.P.	Creedy Park, Crediton	3	3	0
e, J. F.	Creedy Park, Crediton	1	1	0
es, James	Abbey Church Yard, Bath . .	0	10	0
es, Thomas	Burlton Court, Hereford . . .	1	1	0
s, F. A.	Bridestowe, Oakhampton . . .	0	10	0
'is, Henry	Oakhill, near Bath	2	2	0
s, James	Clapton, Bristol	1	0	0
is, Peter	Tregeagle, Bartilivier, Probus, Cornwall	0	10	0
y, J. Tanner	Roseash, South Molton . . .	1	0	0
y, S. B.	Countess Weir, Exeter	1	0	0
y, James	North Molton	1	0	0
y, William	Trowell, Chipstable, Wiveliscombe	0	10	0
w, J.	Exeter	2	0	0
w, R. R. M. (*Arts Hon.* 'c.)	Exeter	. .		
, W.	Kennerleigh, Crediton	0	10	0
, J.	Kennerleigh, Crediton	0	10	0
son, W. and F. . . .	Market Place, Bath	1	0	0
son, William	Exeter	1	0	0

3)

Name.	Residence.	Subscriptions. £	s.	d.
Day, George Hill	Braunton, Barnstaple	0	10	0
Day, J. H. and Son	Shavington, Crewe, Cheshire . .	1	0	0
Day, Son, and Hewitt . . .	22, Dorset Street, Baker Street, London	1	0	0
De Broke, Lady Willoughby	Compton Verney, Warwick . .	1	0	0
Deane, W. A.	Webbery, Bideford	1	1	0
Dendle, Henry	Venn Farm, Sandford, Crediton .	0	10	0
Devon, Earl of	Powderham Castle, Exeter . .	1	0	0
*Devonshire, Duke of . . .	Chatsworth	5	0	0
Dicker, J. and W.	Chagford, Exeter	0	10	0
*Dickinson, F. H.	King Weston, Somerton . . .	5	0	0
Dickenson, W.	8, Upper Harley Street, London .	1	1	0
*Digby, G. D. W.	Sherborne Castle, Sherborne . .	2	0	0
Distin, G.	Paignton, Torquay	0	10	0
Divett, John	Bovey Tracey, Newton Abbot .	1	0	0
Douch, Edwin	Railway Hotel, Taunton . . .	1	0	0
Downing, J. B.	Holme Lacey, Hereford . . .	1	0	0
Downs, William	Romsey, Hants	1	1	0
†Drake, Sir T. T. F. E., Bart.	Nutwell Court, Lympstone, Exeter		. .	
*Drewe, E. S.	The Grange, Honiton	2	2	0
Drewe, E., jun.	The Grange, Honiton	1	1	0
†Druce, Joseph	Eynsham, Oxford		. .	
Duckering, R. E.	Northorpe, Kirton Lindsey . .	1	0	0
Duckham, T.	Baysham Court, Ross	1	0	0
*Duckworth, Sir J. T. B., Bart.	Wear House, Exeter	2	0	0
Duke, H.	Broadmayne, Dorchester . . .	1	0	0
Dunn, James H.	Warminster	0	10	0
Dunsford, Francis	Tiverton	1	1	0
Dunsford, W. H.	Tiverton	1	1	0
*Duntze, Sir J. L., Bart. . .	Starcross, Exeter	2	0	0
*Durant, R.	Sharpham, Totnes	5	0	0
Dymond, Francis W. . . .	Exeter	1	0	0
Dymond, Robert.	Exeter	1	0	0
Dymond, W. P.	Falmouth	1	1	0
Eames, T. F. . .	Cotley Farm, Chard.	0	10	0
Easton, Rich[illegible] .	Heale Mount, Taunton	1	0	0
Easton, W[illegible] .	Bradford, Taunton	1	0	0
Eddy, Jo[illegible]	Kennford, Exeter	0	10	0
Edwards, Charle[illegible]	The Grove, Wrington, near Bristol	1	0	0
Edwards, Joseph	Hutton, Weston-super-Mare . .	1	0	0
Edwards, John	Holway, Taunton	1	0	0
Elliott, George	Higher Swilley, Plymouth .	0	10	0
Elliott, William	Alphington, Exeter	0	10	0
Ellis, E[illegible]	[illegible] Exeter . .	0	10	0

Name.	Residence.	Subscriptions. £.	s.	d.
Ellis, William	Wick Barton, Chagford	0	10	0
*Elton, Sir A. H., Bart.	Clevedon Court	3	3	0
Ennor, Adolphus	Hazel Manor, Compton Martin	1	1	0
Ethelstone, Rev. C. W.	Uplyme Rectory, Lyme Regis, Dorset	1	0	0
Evill, William, Jun.	Lyncombe House, Wandsworth, London	1	0	0
Eyres, Robert	Crown Hotel, landford	1	0	0
*Falmouth, Lord	Tregothnan, Probus, Cornwall	2	0	0
Fane, Colonel Hamlyn	Clovelly Court, Bideford	1	0	0
*Farquharson, J. John	Langton, Blandford	2	2	0
Farrant, Mark	Growing, Collumpton	1	0	0
Farrant, Richard	Clysthydon, Collumpton	0	10	0
Farrant, Robert	*Mirror* Office, Salisbury	1	0	0
Farthing, Walter	Nether Stowey, Bridgwater	1	0	0
Farthing, J. K.	Nether Stowey, Bridgwater	0	10	0
Farthing, Robt.	North Petherton, Bridgwater	0	10	0
Fawcett, E. A.	Childwick Hall, St. Alban's	1	0	0
Fawcett, William, Jun.	Salisbury	1	0	0
Featherstone, William	Wiveliscombe	0	10	0
Feaver, John	West Camel, Ilchester	0	10	0
Feaver, William King	Charlton Adam, Somerton	0	10	0
Ffooks, William	Sherborne, Dorset	1	0	0
Filliter, Freeland	Wareham (Mayor, 1866)	1	0	0
Fishley, Francis	Fitzhead, Taunton	0	10	0
Fitzgerald, H. T. G.	Maperton House, Wincanton	1	1	0
†Flower, George Applin	The Buildings, Stafford Farm, Dorchester			
Flower, Walter	Netton, Salisbury	1	1	0
*Floyer, John, M.P.	Stafford House, Dorchester	2	0	0
Fookes, Henry	Whitchurch, Blandford	1	0	0
Ford, Henry	Southernhay, Exeter	1	0	0
Ford, John, jun.	Rushton, Blandford	0	10	0
Ford, R. B.	Sandford, Crediton	0	10	0
*Fortescue, The Earl	Castle Hill, South Molton	2	2	0
*Fortescue, the Hon. George M.	Boconnoc, Lostwithiel, Cornwall.	2	0	0
Foster, George	Exmouth	0	10	0
Foster, Richard	Castle, Lostwithiel, Cornwall	1	1	0
Fowle, W.	Market Lavington	0	10	0
Fowler, John K.	Prebendal Farms, Aylesbury	1	0	0
Fox, Messrs.	Wellington, Somerset	1	0	0
Fox, Robert	Falmouth	1	1	0
Foxwell, Thomas Somerton	Shepton Mallet	0	10	0
Francis, William	Winstout, Crediton	0	10	0
Franklin, C. D.	Bickenhall, Taunton	1	0	0
Freeman, Wickham, Lt.-Col.	3, Johnstone Street, Bath	1	1	0
Froude, William	Chelston Cross, Torquay	1	0	0

Name.	Residence.	Subscriptions. £.	s.	d.
Fry, John	Woodgate, Wellington, Somerset	1	0	0
Fuller, S. and A.	Bath	1	0	0
Fursdon, George	6, Westbourne Park, London . .	1	0	0
Fussell, John	Rock House, Mells, Frome . .	0	10	0
Gale, W. H.	Manor Farm, Burbage, Marlborough	1	0	0
Gapper, William	Duddleston, Taunton	0	10	0
*Gard, Richard Somers . .	Rougemont, Exeter	2	0	0
†Gardiner, J. R.	Duchy of Cornwall Office . . .	.	.	
Garne, William	Bibury, Fairford, Wilts . . .	0	10	0
*Garratt, John	Bishop's Court, Exeter	2	2	0
Garrett and Son	Saxmundham, Suffolk	2	2	0
Garton and King	Exeter	1	0	0
Geare, John	Exeter	1	1	0
George, William E. . . .	Downside, Stoke Bishop, Bristol	1	1	0
Gerrish, George	Salisbury	1	1	0
Gibbings, R.	Higher Brenton, Kennford, Exeter	1	0	0
Gibbings, Rd.	Thorne Farm, Clannaborough, Crediton	0	10	0
Gibbs, Chas.	Bishop's Lydeard, Taunton . .	0	10	0
Gibbs, E.	Chitterne, Wilts	1	1	0
Gibbs, Robert	Carhampton, Dunster	0	10	0
Gillett, John	Fawler, Charbury, Oxford . . .	1	1	0
Glidden, John	Williton, Taunton	1	0	0
*Glyn, Sir Richard G. . . .	Lewstone House, Sherborne . .	2	2	0
Godding, W. H.	Brimslade, Marlborough . . .	1	0	0
Godwin, Robert C. K. . . .	West Knoyle, Wilts	1	0	0
Goodden, John	Compton House, Sherborne . .	1	0	0
Gordon, Chas.	Wiscombe Park, Honiton . . .	1	1	0
Gould, John	2, Manston Terrace, Exeter . .	1	1	0
Gould, Joseph	Newhall, Broadclyst, Exeter . .	1	0	0
Graddon, William	Brightley, Chittlehampton, Barnstaple	0	10	0
Gray, John	King Weston, Somerton . . .	1	0	0
*Gray, Jonathan	Summerhill House, Bath . . .	2	2	0
*Grenville, Neville M P. . .	Butleigh, Glastonbury . . .	2	0	0
Griffin John . .	New House, Rewe, Exeter . .	0	10	0
Grove, T. Fra[illegible] . . .	Fern House, Salisbury	1	0	0
Groves, Lev[illegible] .	West Kington, Dorchester . . .	0	10	0
Grylls, Major . .	Glynn, Bodmin	.	.	
*Guest, Merthy[illegible] .	Fifehead House, Gillingham . .	.	.	
Gundry, Josep[illegible]	Hyde, Bridport	2	0	0
[illegible]	Walton Farm, Glastonbury . .	0	10	0
[illegible]	Marpool Farm, Exmouth . . .	0	10	0
Hall, [illegible]	[illegible] Hayes Broadclyst, Exeter .	1	0	0

Name.	Residence.	Subscriptions. £.	s.	d.
Halliday, J.	Chapel Cleve, Taunton	1	0	0
Halse, John W.	Mincombe, Sidbury, Sidmouth	0	10	0
Ham, Joseph	Budlake, Broadclyst, Exeter	0	10	0
Ham, William	Worridge, Collumpton	0	10	0
Hamlin, Thomas	Redhill, Wrington	1	1	0
Hamling, Henry	Dean Prior, Ashburton	0	10	0
Hamlyn, John	Buckfastleigh, Ashburton	0	10	0
Hancock, J. D.	Halse, Milverton, Somerset	1	0	0
Hannam, Josiah	Yeovil	1	0	0
*Harbin, G.	Newton Surmaville, Yeovil	2	2	0
Harding, James	Waterson, Dorchester	1	0	0
Harding, Joseph	Marksbury, near Bristol	0	10	0
Harding, T. Goldie	Halsannery, Bideford	1	0	0
Hardon, Edwin	Manchester	1	0	0
Hardwick, T. W.	Lower Court, Long Ashton	1	0	0
Harford, William Henry	Barleywood, Wrington, near Bristol	1	1	0
Harris, Chas.	Ilchester	0	10	0
Harris, Jas.	Bittadon, Barnstaple	0	10	0
Harris, J. D.	Countess Wear, Exeter	1	0	0
Harrison, Col. B.	Kynaston, Hereford	1	1	0
*Hartley, W. H. H.	Lye Grove House, Sodbury	2	2	0
Hatherell, John	Oldbury-on-the-Hill, Chippenham	0	10	0
Hawke, N. T.	Torpoint, Devonport	0	10	0
Hawker, Rev. John Manley	Ideford Rectory, Chudleigh	1	1	0
Hawkes and Spencer	Tiverton	1	0	0
Hayward, Samuel	*Express* Office, Bath	1	0	0
Heard, Robert	Shepton Mallet	1	0	0
Hebditch, Josiah	Stratton, South Petherton	0	10	0
Helmore, Frederick	Newton St. Cyres, Exeter	1	0	0
Helmore, William	Cowley Hill, Exeter	1	0	0
Herridge, Charles	Horsington, Wincanton	1	0	0
Hewer, William	Sevenhampton, Highworth	1	0	0
Hewett, William Henry	Norton Court, Taunton	1	0	0
†Hewitson, W.	Sidbury, Sidmouth	.	.	
Heywood, Joseph	Lake Farm, Abbotsham, Bideford	0	10	0
Hicks, W. R.	Westheath, Bodmin, Cornwall	1	0	0
Hill, John	Moreton Hampstead	1	1	0
Hippisley, Edwin	Wells, Somerset	1	0	0
†Hippisley, J. H.	Stone Easton, Old Down	.	.	
Hitchcock, Henry	Chitterne All Saints, Heytesbury	1	1	0
Hitchcock, W. C.	Everley, near Marlborough	1	0	0
Hitchman, W.	Long Ashton, Bristol	0	10	0
*Hoare, P. R.	Luscombe, Dawlish	2	0	0
†Hockin, Edward	Poughill Vicarage, Bude, Cornwall	.	.	
*Hodge, Wm. Chapple	Pound's House, Devonport	2	2	0
Hodges, Abraham	South Petherton	0	10	0
*Hogg, J. M., Col., M.P.	24, Wilton Crescent, London	2	0	0
Hogg, Rev. J. R.	Torquay	1	1	0

Name.	Residence.	Subscriptions. £.	s.	d.
Hole, Jas.	Knowle House, Dunster	1	0	0
Hole, John	Corton Denham, Sherborne	0	10	0
Hole, Robert	Dunster	1	0	0
†Holdsworth, Henry	Ranstone, Blandford		.	.
*Holford, R. Steiner	Weston Birt House, Tetbury	2	2	0
*Holland, Edward, M.P.	Dumbleton Hall, Evesham	2	0	0
Hollins, John Albert	How Caple, Ross, Hereford	1	0	0
Holman, Richard	Avalon House, Glastonbury	0	10	0
Holmes, Messrs.	Norwich	2	2	0
Hood, Hon. A. N., Major-General	Cumberland Lodge, Windsor	1	0	0
*Hood, Sir A. Acland, Bart., M.P.	St. Audries, Bridgwater	10	0	0
Hooper, John	Withecombe, Chagford, Exeter	1	0	0
Hooper, R. N.	Llansannor Court, Cowbridge	1	1	0
Hooper, William Wills	Exeter	1	1	0
*Horner, Rev. J. S. H.	Mells Park, Frome	5	0	0
Hornsby and Son	Grantham, Lincoln	1	0	0
Horsford, John	Ven Ottery, Ottery St. Mary	0	10	0
Horton, Thomas	Harnage Grange, Salop	1	0	0
Hosegood, George C.	Huish Barton, Bicknoller	0	10	0
Hosegood, Obed	Dillington, Ilminster	0	10	0
Hosken and Son	Loggan Mill, Hayle	1	1	0
Hoskins, Thos.	Haselbury, Crewkerne	1	0	0
Howard, James	Exeter	0	10	0
Howard, J. & F.	Britannia Works, Bedford	1	0	0
Hughes, James	5, Bow Church Yard, London, E.C.	1	0	0
Hulbert, Thos.	Pickwick, Chippenham	0	10	0
†Hulse, Sir Edward, Bart.	Breamore, Salisbury		.	.
Humphries, E.	Pershore, Worcester	1	0	0
Hunt, Nicholas	Paignton, Torquay	0	10	0
Hussey, Thomas	Waybrooke, Exeter	1	0	0
Hussey, John Richards	Brooklands, Exeter	0	10	0
†Hussey, Thomas	Bredy Burton, Bradstock		.	.
Huxham and Brown	Exeter	1	1	0
[illegible]kson, John, [illegible]	Aish, Stoke Gabriel, Totnes	1	0	0
Jacob, Robt.	Baltonsborough, Shepton Mallet	1	0	0
James, J. H	Chichester Place, Exeter	1	1	0
James, [illegible]	Mappowder, Blandford, Dorset	1	0	0
[illegible]	Tredrean Farm, Newlyn East, Cornwall	0	10	0
[illegible]	Higher Bulberry, Kingsbridge	0	10	0
[illegible]enkin[illegible]	Redruth, Cornwall	0	10	0
[illegible]errard, Jo[illegible]	Chideock, Bridport, Dorset	0	10	0
[illegible]nes Henr[illegible]	Portway House, Warminster	1	0	0

Name.	Residence.	Subscriptions. £.	s.	d.
Winslow	Exeter	1	1	0
Inigo	Kelston, near Bath	1	1	0
, J. and J.	*Bath Journal*, Bath	1	0	0
rich, S. T., M.P. . . .	Peamore, Exeter	1	1	0
, Edward P.	The Close, Salisbury	1	0	0
e, Robert	Fountain Street, Guernsey . .	1	1	0
away, J. H.	.. ..	.	.	
way, Mark	Exeter	1	0	0
away, Sir John, Bart. .	Escot, Ottery St. Mary. . . .	2	2	0
r, J.	Nynehead, near Wellington, Somerset	0	10	0
, Thomas	Farrington Gurney, Bristol . .	0	10	0
J. Webb	West Everly, Marlborough . .	1	0	0
, R. King Meade . .	Walford House, Taunton . . .	2	0	0
on, S.	Lynch, Thorverton, Collumpton	1	0	0
on, Wm.	Treymills, Thorverton, Collumpton	0	10	0
ake, W. A.	Weston-super-Mare.	1	0	0
, Rev. J. Buller . .	Vicarage, Morval, Liskeard, Cornwall	1	1	0
, Rev. F. J.	Rectory, Hemyock, Wellington, Somerset	1	0	0
ht, F. W.	Simonsbath, South Molton . .	.	.	
t, Rev. T. H. . . .	Bordhays, Honiton	1	0	0
rs, J. E.	Fitzhead Court, Taunton . . .	1	0	0
es, Frederick	Wrington, Bristol	0	10	0
ton, T. Tutton . . .	Uphill, Weston-super-Mare . .	2	0	0
an, Edmd. Geo. . .	Modbury, Devon	0	10	0
an, Thos.	Brixham, Devon	0	10	0
Robert, jun.	Great Gutton, Shobrooke, Crediton	0	10	0
Samuel	Baldwin Street, Bristol . . .	1	1	0
R.	Redland, Bristol	1	1	0
on, George	Ashford, Barnstaple	1	1	0
on, J. C.	Parrock's Lodge, Chard . . .	0	10	0
on, William	Westdown, Barnstaple	0	10	0
ton, W. H. P. Gore, M.P.	Newton Park, Bath	2	2	0
on, W. H. G.	Clifton, Bristol	1	1	0
. Lee	Dillington House, Ilminster . .	1	0	0
ridge, A. G.	Taunton	1	1	0
bridge, J. C. Baron . .	Tregeare, Launceston	.	.	
on, W.	Wooley, Beaford, Eggesford . .	0	10	0
William Wyndham .	The Heath, Cardiff	0	10	0
James Peard	Bideford	.	.	
Philip	Bourn Farm, Burrington . . .	0	10	0
, Dr.	Wells	1	1	0
Alfred G.	Vitriol Works, Redbridge . .	1	0	0
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Name.	Residence.	Subscriptions. £. s. d.
Lock, George	Barton, Instow, Bideford	0 10 0
†Lock, John Arthur	Northmoor, Dulverton	. .
Lock, Thomas	Instow, Barnstaple	0 10 0
Lockyer and Son	St. Philip's, Bristol	1 0 0
Logan, John	Maindee House, Newport, Monmouth	1 0 0
Long, William	Dodington, Chippenham	0 10 0
*Lopes, Sir M., M.P.	Maristowe, Roborough, Devon	3 0 0
Love, Benjamin	Springfield, Hinton St. George	0 10 0
Lovelace, Earl of	Ashley Coombe, Porlock, Somerset	1 0 0
†Lovell, E.	Dinder House, Wells	. .
Loye, Philip	Stokenham, Kingsbridge	0 10 0
Lush, Benjamin Samuel	Kilmington, Frome	0 10 0
Lush, Joseph	Hartgills, Kilmington, near Bath	1 0 0
Lutley, Thomas	Moorhouse, Holford, Bridgwater	1 0 0
Luttrell, G. F.	Woodland House, Bridgwater	1 0 0
Luttrell, Rev. A. F.	Quantoxhead, Bridgwater	1 0 0
Luttrell, H. A. F.	Badgworth Court, Weston-super-Mare	1 0 0
Luttrell, Rev. A. H. F.	Minehead, Bridgwater	1 0 0
Luxton, Robert George	Brushford, Wembworthy, Devon	1 1 0
Lyne, De Castro F.	Steartfield, Paignton, Devon	1 1 0
Lynn, John	Church Farm, Stroxton, Grantham	1 0 0
Major and Co.	Bridgwater	1 0 0
Mallock, Charles Herbert	Cockington, Torquay	1 0 0
Manning, H.	South Molton	0 10 0
*Mansel, John Clavell	Longthorne, Blandford	2 2 0
Marsh, John	Stratford, Salisbury	1 0 0
Marshall, Sons, and Co.	Gainsborough	1 1 0
Martin, J. M.	Queen Street, Exeter	1 0 0
Mason, Charles G.	Ashprington Court, Totnes	0 10 0
Matthew, J.	Clysthydon, Collumpton	0 10 0
Matthews, Charles	Bradninch, Collumpton	0 10 0
†Maule, Henry St. John (*Hon. Sec.*)	The Hayes, Newton St. Loe, Bath	. .
May, R.	Rewe, Exeter	1 0 0
Mayo, Henry	Cokers Frome, Dorchester	1 0 0
Meetens, George T.	London Hotel, Taunton	0 10 0
*Melsome, Francis John	Norton Bavant, Warminster	1 0 0
Merry, Richard	Goulds, Broadclyst, Exeter	0 10 0
Merson, James	Brinsworthy, North Molton	0 10 0
Merson, Thomas	Holcombe Rogus, Wellington, Somerset	0 10 0
Messiter, Thomas	Barwick House, Yeovil	1 1 0
Middleton, J. F.	Kingston, Taunton	0 10 0
Mildon, W. B.	North Street, Wellington, Somerset	0 10 0
Miles, G. F. W.	Llangattock Park, Crickhowell	1 0 0

Name.	Residence.	Subscriptions. £.	s.	d.
John William . . .	Kingsweston, Bristol	.	.	
Thomas Binns . . .	Langford Court Farm, near Bristol	1	0	0
William	Dixfield, Exeter	1	1	0
Sir Wm., Bart. . .	Leigh Court, Bristol	5	0	0
l, F. P.	Kenn, Exeter	0	10	0
l, Thomas and Son. .	Thorverton, Collumpton . . .	1	0	0
l, William	Leighton, Frome	0	10	0
', Dr.	Exeter	.	.	
, Charles, Jun. . . .	Argyle Street, Bath	1	0	0
Edmund Francis . .	Orcheston St. Mary, Devizes .	1	1	0
d, John	Newton Abbot, Devon . . .	0	10	0
d, H.	Vicarage, Paulton	1	0	0
Edward	Braunton, Barnstaple	0	10	0
Carey Bailey . . .	Bridgwater.	1	1	0
Samuel	Hyde Farm, West Monckton, Taunton	0	10	0
E. W.	Coleshill, Highworth	1	1	0
H. T.	Hatherden House, Andover . .	1	0	0
John	Littlecott Farm, Pewsey, Wilts .	1	0	0
, Frederick	Norton Fitzwarren, Taunton. .	0	10	0
ey, H. G.	Bathealton Court, Wellington, Somerset	2	0	0
t Edgcumbe, Earl of .	Mount Edgcumbe, Devon . . .	2	2	0
, William.	Ford Farm, Newton Abbot . .	0	10	0
ay, James	Tiverton	0	10	0
, Clement R. . . .	Sutton Barton, Collumpton . .	0	10	0
h, J.	Cranwells, Bath (Mayor, 1864–6)	2	0	0
W. B.	Stone Easton, Old Down, Somerset	1	1	0
ry, Samuel P. . . .	Southleigh, Honiton	1	0	0
ıam and Son	Broad Street, Bath	1	0	0
rt, Theodore	St. Germans, Devonport . . .	1	0	0
n, F. W.	Barton Grange, Taunton . . .	1	0	0
on, J. G.	Millaton House, Bridestowe, Okehampton	.	.	
etts, J. Toller . . .	Oaklands, South Petherton . .	1	0	0
s, Gedge	Ashton, near Bristol	1	1	0
n, William	8, Spring Gardens, London, S.W.	1	0	0
John	Huxham, Exeter.	1	0	0
Wm. Harris . . .	Loxbere Barton, Tiverton . .	0	10	0
ı, Thomas	Churchill Farm, Loxbere, Tiverton	0	10	0
orthy, W. P. . . .	Maidenhead, Berks	1	1	0
ıcote, Rt. Hon. Sir S. H., ., M.P.	Pynes, Exeter	5	0	0
ote, Rev. G. B. . .	Feniton Rectory, near Honiton .	1	0	0
y, W. S.	St. Mary's Cottage, Lifton, Devon	0	10	0
thy, Henry	Moretonhampstead, Exeter . .	1	0	0

Name.	Residence.	Subscriptions. £.	s.	d.
Nosworthy, William . . .	Ford, Manaton, Moretonhampstead	0	10	0
Nurcombe, John	Hopcott, Minehead	0	10	0
Oatway, John	Old Cleeve, Dunster	0	10	0
Oatway, Thomas	Dunster	0	10	0
Oatway, William	Oak Trow, Dunster	0	10	0
O'Dogherty, Richard . . .	Talvaus, St. Germans, Devonport	0	10	0
O'Dogherty, Wm.	Landrake, Devonport	0	10	0
Ogilvie, Robert	Tawstock, Barnstaple	0	10	0
Oldreive, Lewis J.	Bridgetown, Totnes	1	0	0
Oliver, John	Manor House, Middlezoy, Bridgwater	1	0	0
Olver, Thomas	Penhallow, Grampound . . .	0	10	0
Page, Robert.	8, Lansdown Crescent, Bath . .	1	0	0
*Paget, R. H., M.P. . . .	Cranmore Hall, Shepton Mallet .	2	0	0
Pain, Thomas	Ugford Cottage, Salisbury . .	1	0	0
Pain, Thomas	Pertwood, Hindon	1	0	0
Pain, Wyndham	New Lodge, Salisbury	1	1	0
*Palk, Sir Lawrence, Bt., M.P.	Haldon House, Exeter	2	2	0
Palmer, John	Sandford, Crediton	1	0	0
Palmer, Robert	Long Sutton, Langport . . .	0	10	0
Palmer, Peter	St. Erney, Landrake, St. Germans	0	10	0
Paramore, Robert	Hindon, Minehead	0	10	0
Parfitt, Barnard and Harvey .	Phœnix Foundry, Devizes . .	1	0	0
Parrimore, J. R.	Diveden Court, Hereford . . .	1	0	0
Parham, William	Northgate Street, Bath . . .	1	1	0
†Parmiter, Wm	Melplaish Court, Beaminster . .		. .	
Parnell, William	Bowden, Yealmpton, Devon . .	0	10	0
Parrett Works	Martock	1	0	0
Parsons, Henry	Haselbury, Crewkerne	0	10	0
Partridge, Geo.	Havod Grove, Moel Grove, Cardigan, Pembrokeshire . . .	0	10	0
[illegible]more and Savery . . .	Exeter	1	0	0
Patton, Thomas	Bishop's Hull, Taunton . . .	1	0	0
Paul, E. W.	Exeter	1	1	0
Paull, John	Brockley Hall, near Bristol . .	1	0	0
Paull, W.	Puddletown, Dorset.	1	1	0
Peach, Robert Edward . . .	Bridge Street, Bath	1	0	0
Pearce, Alfred Joh[illegible] . . .	Chantrey, Aveton Gifford, Ivybridge	1	1	0
Pearse, Rob[illegible] Jha. Thos	Southwarnborough Lodge, Odiham, Hants	2	0	0
Pe[illegible]se, Samuel	Exeter	1	0	0
Pedle[illegible] Geo. [illegible]	Sutton Barton, near Collumpton.	0	10	0
Pedle[illegible] [illegible]ohn	Baronswood, Zeal Monachorum, North Devon . .	0	10	0

Name.	Residence.	Subscriptions. £.	s.	d
', W. F.	Sandford Barton, Tiverton	1	0	0
r, W. R. T.	Budock, near Falmouth	0	10	0
ıll, R. L., M.D.	Venn Bridge House, Dunsford, Exeter	1	1	0
', William	Kingsbury Episcopi, Ilminster	0	10	0
', Samuel B.	Lufton Farm, Yeovil	0	10	0
ral, Captain	Severn House, Henbury	1	0	0
ıs, C. F.	The Grange, Kingston, near Taunton	1	1	0
, S.	Tavistock	0	10	0
;, Wm. Parsons	Yeabridge, South Petherton	0	10	0
bridge, Richd.	Pill, Barnstaple	0	10	0
bridge, Wm.	Woodspring Priory, near Weston-super-Mare	0	10	0
ps, J. H.	3, Queen's Terrace, Southampton	0	10	0
lpotts, Rev. T.	Porthgwidden, Truro	2	0	0
ıps, R. L.	Charlton, Shepton Mallett	.	.	
ley, Sims, and Co.	Bedford Foundry, Leigh	1	0	0
ıy, R.	Pincourt Farm, Pinhoe, Exeter	0	10	0
t, Lady	Chippenham Park, Soham	2	2	0
kney, Erlysman C.	Berwick St. James, Salisbury	.	.	
ney, William	Milford House, Salisbury	1	0	0
ıey, W.	Somerton	.	.	
, John	Strete Ralegh Farm, Whimple, Exeter	1	0	0
ld, A. J.	Eyp Farm, Bridport	1	0	0
ld, John	Symondsbury, Bridport	1	0	0
ıan, Samuel	Bishop's Hull Manor, Taunton	.	.	
ın, J. S.	Dunchideock, Exeter	1	0	0
ın, Rev. W.	Aveton Gifford, Kingsbridge	1	0	0
Thomas	Freetown, Ledbury	1	0	0
Frederick	Matford Farm, Alphington	0	10	0
James Pitt	Newton, Drewsteignton, Chagford	1	0	0
Nicholas	South Allington, Kingsbridge	0	10	0
aul, John	Bedford Street, Plymouth	1	0	0
nett, Rev. C.	Holton, Wincanton	1	0	0
d, George	High Street, Taunton	0	10	0
'd, Richard W.	Blagdon, Paignton, Torquay	0	10	0
more, Lord	Poltimore, Exeter	3	3	0
ɔrd, Rev. W.	Drewsteignton, Exeter	1	1	0
ng, T.	Whatley, Frome	0	10	0
ng, Thomas	Warminster, Wilts	1	0	0
Joseph	Coate, Martock	0	10	0
, Gabriel Stone	Brent Knoll, Weston-super-Mare	1	0	0
, Richard	Bathealton, Wellington	0	10	0
, William	North Widcombe, near Blagdon	0	10	0
', W. J. P.	Symondsbury, Bridport	.	.	
ɜr, W.	Hembury Fort, Honiton	2	0	0
man, Lord	Bryanston, Blandford	5	0	0
man, Hon. W. H. B., M.P.	Bryanston, Blandford	2	0	0
ɜmouth, Earl of	Eggesford, North Devon	2	0	0
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Name.	Residence.	Subscription. £. s. d.
Potter, Thomas	Yellowford, Thorverton, Collumpton	1 0 0
Prangley and Company . .	Salisbury	1 0 0
Pratt, John	Tallaton Farm, Tallaton, Ottery.	0 10 0
Pratt, Richard	Broad Oak, Clysthydon, Collumpton	0 10 0
Preston, Margaret G. G. . .	Leigh House, Chulmleigh, Devon	1 1 0
Prideaux, Sir E. S., Bart. .	Netherton Hall, Honiton . . .	1 1 0
*Prior, R. C. A.	Halse House, near Taunton . .	2 0 0
Proctor, T. and H.	Cathay, Bristol	1 1 0
Pullen, William S.	Parsonage Farm, Warminster .	1 1 0
Pulman, Harry P.	Colyton, Devon	0 10 0
Purser, Edward	40, New Bridge Street, London, E.C.	1 0 0
Pyatt, Charles H.	Combe Hay, Bath	0 10 0
Pycroft, George	Kenton, Starcross, Exeter . . .	1 0 0
Pyke, Capt. John, R.N. . .	Ford House, Bideford	1 0 0
Quartly, James	Molland House, South Molton .	0 10 0
*Quicke, John	Newton House, Newton St. Cyres, Exeter	2 0 0
Quicket, Edward	Langport	1 0 0
Quin, James, A.	National Provincial Bank, Bath .	1 0 0
Radcliffe, C. L.	Tothill House, Plymouth . . .	1 0 0
Raddall, Warne	Drinnick, South Petherwin, Launceston	0 10 0
Radmore, George	Court Hayes, Thorverton, Collumpton	1 0 0
Radmore, G. K.	Pitt Farm, Thorverton, Collumpton	1 0 0
Raikes, Charles	Netheravon House, Amesbury .	1 1 0
Ransome, James Allen . .	Orwell Works, Ipswich . . .	1 1 0
Ransome, Robert Charles . .	Orwell Works, Ipswich . . .	1 1 0
Rawlence, George	Bulbridge, Wilton	1 0 0
Rawlence, James	Bulbridge, Salisbury	1 1 0
Rawlinson, George	Batheaston, Bath	1 1 0
Raynbird and Co.	(Seedsmen), Basingstoke . . .	1 0 0
Reading Iron Works Company	Reading	1 1 0
Redman, Thomas H . .	Abbotstone, Alresford, Hants . .	0 10 0
*Reed, J. Haythorn[illegible]	Burnham, Somerset.	. .
Reese, Ebenezer .	Ross, Hereford	1 0 0
Reeves, Robert and [illegible]	Bratton, Westbury, Wilts . .	1 0 0
Rendell, Captain [illegible]	West Harptree	1 0 0
Rendell, Rob[illegible]	Willing, Rattery, Ashburton . .	0 10 0
Rew, Thomas	Coombhead Farm, Tiverton . .	1 1 0
Riccard, J. [illegible]	South Molton	2 2 0
Richards, Th[illegible]	Winsanton, Somerset . . .	0 10 0

Name.	Residence.	Subscriptions. £.	s.	d.
:ds, Francis Trood . .	Netherexe, Exeter	0	10	0
rdson, George	Harcourt Villa, Salisbury . . .	1	1	0
ıond and Chandler . .	Salford, Manchester	1	0	0
ıan, Thos.	Broad-Nymet, Bow, Devon . .	1	0	0
ray, A..	Blackanton, Totnes	1	1	0
n, Richard Henry . .	Salisbury	1	0	0
ırtes, Thos. J. Agar, M.P.	Lanhydroc House, Bodmin . .	2	0	0
:ts, Richard	*Dorset County Chronicle*, Dorchester	1	1	0
:ts and Sons	Bridgwater	1	0	0
:ts, William	Broad Gate, Exeter	1	0	0
:tson, Henry	Overstowey, Bridgwater . . .	1	1	0
ɔn, William	Wilton, Salisbury	1	1	0
ırd, John R.	Aldwick Court, Wrington . .	1	0	0
J. C.	Lynmouth, Lynton	.	.	
:s, Francis	Hillhay, Fowey, Cornwall . . .	0	10	0
:s, Sir F., Bart. . . .	Blachford, Ivybridge	1	0	0
:s, John	Avediston, Salisbury.	1	0	0
Christopher	Zeals Farm, Mere, Wilts . . .	1	0	0
liffe, C.	Milverton, Wellington	1	0	0
W. N.	Cove, Tiverton	1	0	0
, G. F.	Venton, Liskeard	0	10	0
g, L. H..	*Journal*, Sherborne	0	10	0
sell, Right Hon. Earl .	Chesham Place, London . . .	.	.	
t Germans, Earl of . .	Port Elliot, Devonport	5	0	0
y, John	Burnham Market, King's Lynn, Norfolk	1	0	0
r, Robert	Westcott, Collumpton	0	10	0
r, William	North Tawton, Devon	0	10	0
ɔson, John	Brympton, Yeovil	0	10	0
ıelson, Bernhard . . .	Banbury	1	0	0
ɜrs, E. A.	Stoke Hill, Exeter	1	0	0
ford, Edwd. Ayshford .	Nynehead Court, Wellington .	3	0	0
lers, Alfred	Market Lavington, Devizes . .	1	1	0
lers, Samuel	Market Lavington, Devizes . .	1	1	0
:y, John Thomas . . .	Modbury, Plymouth.	1	0	0
e, A. B..	Bristol Bank, Bristol	1	0	0
ɔell, G. T., R.N. . .	Kingwell, Bath	2	0	0
:t, Wm. Robson, Ph. D.	St. Leonard's, Exeter	.	.	
, J.	Warminster	1	0	0
', H. N.	Castle Hill House, Nether Stowey	1	1	0
ɔod, William Henry . .	West Knoyle, Wilts	1	0	0
mour, Alfred, M.P. . .	Knoyle House, Hindon	2	0	0
mour, Rev. Sir J. H. C., rt.	Northchurch, Birkhampstead .	.	.	
ıour, H. D., M.P. . .	39, Upper Grosvenor Street, London, W.	1	0	0
ɔe, Robert	Courtlands, East Grinstead . .	1	0	0

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Name.	Residence.	Subscriptions. £. s. d.
Shepheard, Joseph	Torpoint, Devonport	0 10 0
Shepherd, Thomas	Kingsbury Episcopi	0 10 0
Sheppard, E. J.	Huish Rectory, Beaford, North Devon	1 1 0
Shiles, John	Clyst St. George, Exeter	0 10 0
Shore, J. H.	Whatley Combe, Frome	1 0 0
Shum, Frederick	Laura Place, Bath	1 1 0
*Sidmouth, Lord Viscount	Up-Ottery, Devon	2 2 0
†Sillifant, John	Coombe, Copplestone, North Devon	. .
†Sillifant, John Woolcombe	The Cottage, Ottery St. Mary	. .
Simonds, Professor	Royal Veterinary College, Camden Town, London	1 0 0
Simpson, Alexander	72, Mark Lane, London, E.C.	1 0 0
Simpson and Son	Melksham	1 0 0
Singer, John	North Brewham, Evercreech	0 10 0
*Skrine, Henry Duncan	Warleigh, Bath	2 0 0
Sloper, A. M.	Bishop's Cannings, Devizes	1 1 0
Smith, Augustus	Tresco Abbey, Scilly Islands, and 1, Eaton Square, London	1 0 0
Smith, Bartholomew	Timsbury	1 0 0
Smith, F. A.	Escott Cottage, Ottery St. Mary	0 10 0
*†Smith, P. Protheroe	Tremorvah, Truro	. .
Smith, Henry Trefusis	Morrice Square, Devonport	1 0 0
Smith, John A.	Bradford Peverell, Dorchester	1 1 0
Smith, Thomas	Stratford-sub-Castle, Salisbury	1 1 0
Smith, J. P.	Hereford	1 0 0
Smyth, Frederick L.	Westland Pound, Kentisbury, near Barnstaple	0 10 0
Snell, Benjamin	Wayton, Hatt, Devonport	0 10 0
Snow, John, & Co.	Bristol	1 1 0
Snow, Thomas	Franklyn, Exeter	1 1 0
Sobey, John	Trewolland, Liskeard	0 10 0
†Somerville, James Curtis	Dinder House, Wells	. .
Sotheby, Rev. T. H.	Milverton	1 1 0
†Spackman, Henry	Bath	. .
Sparks, W.	Crewkerne	1 0 0
*Spicer, Henry	*Dorset County Chronicle*, Dorchester	2 2 0
Spiller, Robert	Branscombe, Sidmouth, Devon	1 0 0
Spooner and Bayley	Southampton	1 0 0
Spurway, Rev. Edward	Heathfield, Taunton	1 0 0
Spurway, John P.	Spring Grove Park, Milverton	1 0 0
Squarey, E. P.	Salisbury	1 0 0
Stallard, William	Brockhampton, Ross, Hereford	1 0 0
Steed, H.	Muckwell, St. Erney, Cornwall	0 10 0
Stephens, George	Gunnislake, Tavistock	1 0 0
Stephenson, Geo. and Jno.	Old Town St., Plymouth	1 1 0
Stevens, J. C. Moore	Winscott, Great Torrington	1 0 0
Stokes, F.	Sherborne, Dorset	1 0 0
Stokes, George	Salisbury	1 0 0
Stokes, Robert	Salisbury	1 0 0

Name.	Residence.	Subscriptions. £.	s.	d.
, John S.	Newport, Monmouth	0	10	0
, John Jefferies . . .	16, George Street, Mansion House, E.C.	1	0	0
hey, Sir Edward, Bart. .	Sutton Court, Pensford, Bristol .	1	0	0
gways, H. B.	Shapwick, Glastonbury . . .	1	0	0
on, Alfred	Rushall, Marlborough	1	0	0
on, Richard	Stapleton, Bristol	1	0	0
ey, James	Drayton, near Langport . . .	1	0	0
ey, Vincent	Hill House, Langport	1	0	0
ley, Sir G. S., Bart., M.P.	Hartland Abbey, Bideford . .	2	0	0
e, William	Bristol	1	1	0
s, John	Salisbury	1	1	0
n, John, and Sons . .	(Seedsmen), Reading	1	0	0
ham, Rev. John Philip	Collumpton, Devon	1	0	0
s, John	Coombe, Sherborne	0	10	0
, James	Winsford, Dulverton	0	10	0
, John	Winsford, Dulverton	0	10	0
nton, Lord	Quantock Lodge, Bridgwater . .	5	0	0
ton, William	Redlynch, Downton	1	0	0
r, H. T.	Holmer, Hereford	1	0	0
r, William	Showle Court, Ledbury, Hereford	1	0	0
lor, William	Harptree Court, East Harptree .	2	0	0
ler, Jas. G. T. . . .	Lindridge, Newton Abbot . .	1	0	0
as, J. S.	Wellington House, Clevedon . .	1	1	0
as, J. L., and Co. . .	163, Fore Street, Exeter . . .	1	0	0
as, John C.	Cary, Fitzpain, Somerton . . .	1	0	0
pson, John	Badminton, Gloucester	1	1	0
pson, William . . .	Bath (Mayor, 1866-7)	1	0	0
mpson, William . . .	Weymouth	.	.	
son, R. T.	Broomford Manor, Exbourne, Devon	1	1	0
aycroft, Rev. J. . . .	Thornycroft Hall, Congleton . .	1	0	0
g, J. Gale D.	Alford, Castle Cary	1	0	0
kmorton, Sir W., Bart. .	Buckland, Farringdon, Berks .	1	0	0
nne, Rev. Lord John .	Haynes Park, Bedford	2	0	0
, Frank	Collaton Raleigh, Exeter . . .	0	10	0
r, Benjamin C. . . .	Bristol Road, Birmingham . .	1	0	0
, William, M.P. . . .	42, Lowndes Square, London, S.W.	2	0	0
John Seymour . . .	Milton Abbas, Blandford, Dorset.	0	10	0
Ambrose	Telland, Quitheock, St. Germans	0	10	0
s, John King	Langford, Lechlade, Gloucester .	0	10	0
ood, Henry	Sherwood Farm, Feniton, Honiton	0	10	0
, R. John	Mells, Frome	0	10	0
isend, George T. . . .	Salisbury	1	0	0
, John	Preston, near Yeovil	0	10	0
legar, Lord	Tredegar Park, Newport, Monmouth	2	0	0
wny, Charles	Plymouth	1	1	0

Name.	Residence.	Subscriptions. £.	s.	d.
Tremaine, James	Trevarton, Newlyn, Cornwall	0	10	0
Tremaine, John	Trerice, Newlyn East, Cornwall	0	10	0
*†Tremayne, John	Heligan, St. Austell		..	
Trethewy, Henry	Grampound, Cornwall	0	10	0
*Trevelyan, Sir W. C., Bart.	Nettlecombe Court, Taunton	2	0	0
Trickey, William	Kelston, Bath	1	0	0
Trist, W.	Langford Barton, Ugborough, Ivybridge	1	0	0
Trix, W.	South Molton	0	10	0
Trood, E.	Bowhay, Exeter	1	0	0
Trood, Robert	Matford, Exeter	0	10	0
Troyte, C. A. W.	Huntsham Court, Bampton, Devon	1	1	0
Truck, John	Preston, Yeovil	0	10	0
Tuck and Son	Market Place, Bath	1	1	0
Tucker, E. B.	Penaelick, Truro	1	0	0
Tuckett, James	Stockleigh, Crediton, Devon	0	10	0
Turner, Charles H.	Dawlish	0	10	0
Turner, George	Beacon Downs, Exeter	1	0	0
Turner, J.	Bidwell, Thorverton, Collumpton	0	10	0
Turner, Philip	The Leen, Pembridge, Leominster	1	0	0
Tuson, Henry	Ilchester	1	0	0
Tuxford and Sons	Boston, Lincoln	1	1	0
Tweedy, R.	Tregolls, Truro	1	0	0
*Tyrrell, John	Exeter	2	2	0
Uttermare, T. B.	Langport	1	0	0
Vale, W.	Eddington, Bridgwater	1	0	0
Vaughan, John	Raby Villa, Bathwick, Bath	0	10	0
Veale, Wm.	Coombe, Cawsand, Devonport	0	10	0
Venn, John	Whimple, Exeter	0	10	0
Venn, John	Slade House, Payhembury, Honiton	0	10	0
Venn, Robert W.	Northcott, Uffculm, Collumpton	0	10	0
Venning, Daniel	Whalesborough Farm, Stratton, Cornwall	0	10	0
Vezey, Messrs. R. and E.	Long Acre, Bath	1	0	0
Vidal, E. U.	Cornborough, Bideford	1	0	0
Vainwright, Charles R.	Shepton Mallet	1	1	0
Vainwright, J. W. I.	Shepton Mallet	1	1	0
Vait, W. Savage	Woodborough, Bath	2	0	0
Walker, John	Westfield House, Horner, Hereford	1	0	0
Valkey, J. E.	Ide, Exeter	1	0	0
Vallis and Co	Basingstoke	1	0	0
Valrond [illegible]	Bradfield, Collumpton	2	2	0

Name.	Residence.	Subscriptions. £.	s.	d.
Ward, Horatio	Salisbury	1	0	0
Ward, Robert	Railway Station, Exeter	1	1	0
†Ward, Thomas Johnson	Olveston, Bristol	.	.	
†Warner, Thomas	Sussex Square, Brighton	.	.	
Warre, H.	Bindon House, Wellington	1	1	0
Warren, Robert	Gosford, Ottery St. Mary	0	10	0
Warry, George	Shapwick, Glastonbury	1	0	0
Warry, Thomas	Martock, Somerset	1	0	0
Wason, J. E. T.	Inglesbatch, Bath	0	10	0
Waters, Edward	Stratford-sub-Castle, Salisbury	1	1	0
Watson, H. H.	Dartington, Totnes	1	0	0
Watt, Robert	Shepton Mallett	1	0	0
Watts, V. B.	Turnworth Farm, Blandford	1	0	0
Webber, John	Beacon Hill, London	1	0	0
Webber, John	West Bagborough, Taunton	0	10	0
Welsh, Henry R.	Monckton Deverell, Warminster	0	10	0
*Welman, C. Noel	Norton Manor, Taunton	2	2	0
Whatman, C. M. C.	Salisbury	1	0	0
Wheeler, A. C.	Kingsholm, Gloucester	1	0	0
Wheler, Sir Trevor, Bart.	13, Clarendon Square, Leamington	1	0	0
Whieldon, George	Wyke Hall, near Wincanton	1	1	0
White, Arthur	Wrangaton Manor House, Ivybridge	1	0	0
White, John	Zeals Farm, near Bourton	0	10	0
White, J. F.	Woodbury Salterton, Exeter	0	10	0
White, Robert	Mells, Frome	0	10	0
Whitehead, Arthur	Castle Cary	0	10	0
Whittaker, John Saffery	Bratton, Westbury	1	0	0
Whitley, Nicholas	Truro	0	10	0
Widdicombe, John	Torrhill, Ivybridge	1	0	0
Wightman and Dening	Iron Foundry, Chard	1	0	0
Wigmore, John	Bickerton Court, Ross, Hereford	1	0	0
Wilkinson Brothers	25, Market Place, Bath	1	0	0
Willett, J. S.	Petticombe, Torrington	1	0	0
Williams, Edward Wilmot	Hemmington, Dorchester	1	1	0
Williams, Rev. P.	Rewe, Exeter	1	1	0
*Williams, Sir William, Bart.	Heanton Court, Devon, and Tregullow, Cornwall	2	0	0
Williams, F. M., M.P.	Perranarwarthal, Penryn	1	0	0
†Williams, Herbert	Stinsford, Dorchester	.	.	
†Williams, Robert	Bridehead, Dorchester	.	.	
Willis, Joseph D.	Bapton, Heytesbury, Wilts	0	10	0
Wills, George	Kelly, Lustleigh, Newton Abbot	0	10	0
Wills, G. G.	Colebrook, Coppleston, North Devon	0	10	0
Wills, John	Hampnett, North Leach	1	0	0
Wills, John	Ashill Farm, Bishop's Teignton	0	10	0
Wills, Thomas	Eastwrey, Lustleigh, Newton Abbot	0	10	0
Willyams, Edwd. Bridges	Carnanton, St. Columb, Cornwall	1	0	0
Wilton, J. and Son	Salisbury	1	0	0

Name.	Residence.
Wippell, John	Barton, Alphington, Exeter .
Wippell, Richard	Rudway, Thorverton . . .
Wippell, William	Rudway, Thorverton, Collumpt
Wish, Thomas	Broadclyst, Exeter . . . .
Withycombe	Gothelney House, Charlinch, ne Bridgwater. . . . .
†Wollocombe, J. B. . . .	Dunterton, Tavistock . . .
Wood, G. H.	*Gazette Office*, Bath . . . .
Wood, John	Ashfield, Martock . . . .
Wood, Henry	Woolley House, Romsey . .
Wood, W. A.	77, Upper Thames Street, Lond
Woodcock, John	Netherhampton, Salisbury .
Woodcock, William Henry .	Fugglestone St. Peter, Wilts .
Woods and Cocksedge . . .	Suffolk Iron Works, Stowmark
Woodward, Richard . . .	Chargrove, Cheltenham . .
Woolcombe, Thos.	Devonport . . . . .
Woolfryes, W.	Banwell . . . . .
Worth, S. L.	293, Oxford Street, London .
Wrey, Rev. John	The Crescent, Teignmouth .
Wyatt, James C.	Donhead St. Mary . . . .
Wyndham, Charles Wadham	Salisbury . . . . .
Yells, W., Jun.	Round Robin, Highworth, Wil

Donations

RECEIVED BY THE SOCIETY SINCE ITS EXTENSION.

Name.	Residence.	Date.	Amount.		
			£.	s.	d.
and, Sir P. P. F. P., Bart.	Fairfield, Bridgwater . .	1852	10	0	0
,, ,,	,, ,,	1853	10	0	0
and, Sir T. D., Bart. . .	Killerton, Exeter	1853	10	0	0
air, Desmond	Heatherton, Taunton . .	1852	5	0	0
air, Alexander	Heatherton, Taunton . .	1853	5	0	0
dington, Hon. W. W. (now Viscount Sidmouth) . . .	Up Ottery	1853	2	2	0
ıold, G., jun.	Dolton, Crediton	1854	2	0	0
ıburton, Lord	The Grange, Hants . . .	1854	10	0	0
ter, Rev. R.	Compton Martin	. .	1	1	0
lford, Duke of (deceased) .	Endsleigh	1852	21	0	0
ıverie, Hon. P. P.	Brymore, Bridgwater . .	1853	5	5	0
ttle, Alfred	Combe Hay, Bath	1855	1	0	0
ınel, I. K. (deceased) . .	Westminster	1852	5	0	0
de, John Mac	Plymouth	1853	0	10	0
rnard, Charles F.	Plymouth	. .	0	5	0
sby, Wm.	Newton, near Bedale . .	1852	1	0	0
,, ,,	,, ,,	1853	5	0	0
row, J. M. (deceased) . .	Stoberry, Wells	1852	1	0	0
rk, J. A.	Street, Glastonbury . . .	1854	2	4	0
yton and Co.	Lincoln	1853	2	0	0
nes, James	Barbridge, Nantwich . .	1853	5	0	0
ner, R.	Torweston, Taunton . .	1853	0	10	0
nish, R. S.	Mayor of Exeter	1853	1	1	0
yton, A.	Pentillie Castle, Plymouth	1853	5	0	0
rett, Edward (deceased) .	Bystock, Exeter	1852	10	0	0
ake, Rev. —	Stourton Rectory	1853	1	0	0
,, ,,	,, ,,	1854	1	0	0
,, ,,	,, ,,	1855	1	0	0
owe, E. S.*	The Grange, Honiton . .	. .	10	0	0
rant, R.	Sharpham, Totnes. . . .	1852	5	0	0
,, ,,	,, ,,	1853	5	0	0
rington, Lord Visc. (now Earl Fortescue)	Castle Hill, South Molton	1853	5	0	0
,, ,,	,, ,,	1867	2	2	0
s, Brothers	Tonedale, Wellington . .	1855	5	0	0
end, A, per J. W. King .	. .	1854	1	0	0
rdon, C.	Gittisham, Honiton . . .	1855	1	0	0
nsman and Son	Castleworks, Woburn . .	1852	1	0	0
od, Sir A. A., Bart. . . .	St. Audries	1852	10	0	0
,, ,,	,, ,,	1853	10	0	0

* Originally paid as a life member, but is now an annual subscriber of 2*l.* 2*s.*, and his ıposition therefore appears as a donation.

Name.	Residence.	Date.	Amount. £.	s.	d.
Horner, Rev. John	Mells Park, Frome . . .	1852	5	0	0
" "	" "	1853	5	0	0
Hoskins, Thomas	Haselbury, Crewkerne . .	1853	1	0	0
Huyshe, Rev. John	Clysthydon, Collumpton .	1855	5	0	0
Ilchester, Earl of (deceased)	London	1852	10	10	0
Johnson, W. B.	Glastonbury	1856	1	1	0
Keene, Messrs.	Bath	1853	0	10	6
Kennaway, Sir J., Bart. . . .	Escot	1852	10	0	0
" "	" "	1853	5	0	0
Knyfton, T. T.	Uphill	1852	5	0	0
" "	" "	1853	2	0	0
Ley, William (deceased) . .	Woodlands, Kenn	1853	3	3	0
" "	" "	1854	3	3	0
Lopes, Sir R., Bart. (deceased)	Maristow	1853	10	0	0
Marychurch and Co.	Haverfordwest	1855	2	0	0
Miles, Sir W., Bart.	Leigh Court	1853	5	0	0
Naish, W. B.	Stone Easton	1852	5	0	0
Newman, Thomas	Mamhead	1853	10	0	0
Newton, J. G.	Bridestowe, Okehampton .	1854	2	0	0
" "	" "	1855	5	0	0
Northcote, Sir S. H., Bart., M.P.	Pynes	1853	10	0	0
Pearse, Rev. S. W.	Ivybridge	1853	1	0	0
Phillips, Dr.	Torquay	1853	1	0	0
Portman, the Lord	Orchard Portman	1852	10	0	0
" "	"	1853	10	0	0
Radcliffe, Rev. W.	Warleigh, Plymouth . .	1853	5	0	0
Randell, Thomas	Market Rasen	1856	1	1	0
Riccard, J. E. J.	South Molton	1853	1	1	0
Sanders, Thomas (deceased) .	Park Street, Bristol . . .	1853	1	1	0
Smith, A. K.	Kettering, Exeter	1852	4	4	0
Smith and Ashby	Stamford	1852	1	0	0
Sidmouth, Lord Viscount (deceased)	Up Ottery, Devon . . .	1853	5	0	0
Sparks, W.	Crewkerne	1852	10	0	0
Synge, F. H. (deceased) . . .	Weston-super-Mare . . .	1852	1	0	0
Taylor, Robert	Ashclyst, Broadclyst . .	1853	0	10	0
Tuyte, A. H. D. (deceased) .	Huntsham Court, Tiverton	1852	3	0	0
Tivermare, T. B.	Langport	1853	1	0	0
Velland, Rev. L. P.	Tallaton, Ottery	1856	0	10	0
Vightman and Dening . . .	Chard	1852	2	0	0
Villcox, Edmund	Godney, near Wells . . .	1854	0	10	0
Williams, James	Bath	1854	4	0	0

DONATIONS FOR SPECIFIC PURPOSES.

Name.	Residence, &c.	Date.	Amount. £.	s.
Acland, Sir T. D., Bart.	To Increase the Local Prizes at Barnstaple	1859	50	0
Acland, T. D., M.P.	Prizes for Flannel	1858	5	0
Buller, J. W. (deceased)	Prizes for Ponies	1859	10	10
Gray, Jonathan . .	Prizes for Flannel	1858	5	0
Hood, Sir Alexander, Bart.	Addition to the Society's Prize for Two-year-old Colt for Agricultural purposes	1857	10	0
Knight, F. W. . .	Prizes for Exmoor sheep	1859	10	10
Miles, William . .	Prizes for Shoeing Horses . . .	1859	6	6
" " . .	" "	1860	6	6
" " . .	" "	1861	6	6
" " . .	" "	1862	6	6
" " . .	" "	1863	6	6
" " . .	" "	1864	6	6
" " . .	" "	1865	6	6
" " . .	" "	1866	6	6
Parker, H.	Towards Prizes for Hampshire Down Sheep	1854	0	10
Sillifant, John . . .	Prize for Devon Bull	1859	10	10
Taylor, Chas. . . .	Towards Prizes for Hampshire Down Sheep	1854	0	10
The Barnstaple Local Committee . . .	For Local Prizes for Stock . . .	1859	85	0
The Bristol Local Committee . .	For Local Prizes for Stock . . .	1864	106	0
The Bristol Society of Merchant Venturers	For Local Prize for best Stallion .	1864	50	0
The Hereford Local Committee . .	For Local Prizes for Stock, &c. . .	1865	358	0
The Salisbury Local Committee. . .	For Local Prizes for Stock . . .	1866	. .	
" "	For Local Prizes for Dogs . . .	1866	. .	
Trevelyan, Sir Walter C.	For Prize Essay on Cider . . .	1858	25	0
Williams, C. C. . .	Prizes for Flannel and Implements	1858	23	0
Woolly, B. C. . . .	Towards Prizes for Hampshire Down Sheep	1854	1	0
Woolly, W.	" " "	1854	0	10

SPECIAL DONATIONS.

	Date.	Amount. £.	s.	d.
Poultry Show at Plymouth, by Jonathan Gray . . .	1853	282	16	0
Poultry Show at Bath, by Jonathan Gray	1854	458	0	4

Subscriptions

FROM CITIES AND TOWNS SELECTED FOR THE SOCIETY'S MEETINGS.

	Date.	Amount. £.	s.	d.
Taunton, town of	1852	210	0	0
Plymouth, Devonport, and Stonehouse, towns of . .	1853	450	0	0
Bath, city of	1854	450	0	0
Tiverton, town of	1855	450	0	0
Yeovil, town of	1856	450	0	0
Newton Abbot, town of	1857	700	0	0
Cardiff, town of	1858	800	0	0
Barnstaple, town of	1859	800	0	0
Dorchester, town of	1860	900	0	0
Truro, town of	1861	900	0	0
Wells, city of	1862	900	0	0
Exeter, city of	1863	900	0	0
Bristol, city of	1864	1000	0	0
Hereford, city of	1865	900	0	0
Salisbury, city of	1866	900	0	0

DONATIONS TO THE ARTS DEPARTMENT,

›LLECTED BY THE SPECIAL SUBSCRIPTION COMMITTEE.

EDWARD SIMCOE DREWE, *Chairman.*

BARNSTAPLE MEETING, 1859.

	£.	s.	d.
ıgton, Hon. W. W.	1	0	0
ıd, Sir T. D., Bart..	10	0	0
ıd, Sir P. P. Pere-ne, Bart.	10	0	0
ıd, T. D.	5	0	0
ıd, Henry Went-rth, M.D.	1	1	0
›orth, E.	1	0	0
›rd, His Grace the ıke of	10	0	0
ıridge, R. (Mayor of rnstaple)	3	3	0
›her, W.	3	3	0
›r, J. Wentworth, P.	2	0	0
ley, John	0	10	0
›ck, G.	5	0	0
›ld, J.	2	0	0
n, G.	1	1	0
on, Right Hon. Lord	5	0	0
›rd, Right Hon. Lord	5	0	0
ston, Right Hon. Lord	5	0	0
›n, R. W. . . .	1	1	0
bertson, W. . . .	1	1	0
›rell, J. H. . . .	2	2	0
sh, James . . .	2	0	0
ter, J.	1	1	0
n, Right Hon. Earl of	2	0	0
›, Right Hon. Earl ›rd Lieut. of Glou-tershire)	5	5	0
›e, E. S.	5	0	0
J.	3	3	0
ant, Bosville . . .	1	1	0
am, J.	1	1	0
ı, G.	1	1	0
›, G. W.	5	0	0
ıt, R.	5	5	0
lle, H.	0	10	0
›scue, Right Hon. the ›l (Lord Lieut. of ›von)	5	0	0

	£.	s.	d.
Franklin, George . .	1	1	0
Friend, A	0	10	0
Gard, R. S. M.P. . . .	5	5	0
Gray, Jonathan . . .	5	5	0
Grenville, R. Neville . .	5	0	0
Garratt, J.	2	0	0
Goodwin, J.	1	1	0
Hood, Sir Alex. Acland, Bart.	5	0	0
Hussey, T.	0	10	0
Hodge, H.	0	10	0
Heberden, Rev. W. . .	2	2	0
Huyshe, Rev. J. . . .	2	0	0
Hayward, J.	1	1	0
Hoare, P. R.	5	0	0
Hippisley, J. H. (High Sheriff of Devon) . .	5	0	0
Heathcoat and Co. . . .	5	0	0
Honey, W. J.	1	1	0
Ilchester, Right Hon. Earl	5	0	0
Jeboult, H. P.	1	1	0
Kennaway, Sir J., Bart..	2	2	0
Kemp, James	1	0	0
Kekewich, S. T., M.P. .	5	0	0
Lindsay, Hon. Colin . .	2	2	0
Lopes, Sir Massey, Bart., M.P.	5	5	0
Locke, J. A.	5	0	0
Latimer, Thomas . . .	2	2	0
Miles, W.	10	0	0
Macready, W. C. . . .	2	2	0
Minton and Co. . . .	5	5	0
Miller, A. R.	1	1	0
Moysey, H. G.	2	2	0
Newman, Thomas . .	10	0	0
Ogilvie, R.	1	1	0

	£.	s.	d.
Portsmouth, Right Hon. Earl	10	0	0
Portman, Right Hon. Lord (Lord Lieut. of Somerset)	5	0	0
Poltimore, Right Hon. Lord	5	0	0
Prideaux, Sir E. S., Bart.	2	2	0
Poole, Gabriel S.	5	0	0
Pitman, S.	3	3	0
Pycroft, G.	2	0	0
Pyke, Capt., R.N.	1	0	0
Pasmore and Savery	1	1	0
Rolle, Hon. Mark	10	0	0
Roberts, W.	1	1	0
Rowe, Mark	1	1	0
Sillifant, J. (President)	10	0	0
Sanford, W. Ayshford	1	0	0
Stucley, Sir G. S., Bart.	10	0	0
Talbot de Malahide, Right Hon. Lord	5	0	0
Trefusis, Hon. Charles, M.P.	3	3	0
Throckmorton, Sir R., Bart.	5	0	0
Trevelyan, Sir Walter, Bart.	5	0	0

	£.	s.	d.
Tyrrell, John (Recorder of Barnstaple)	5	5	[illegible]
Templeton, J.	1	1	[illegible]
Thomas, J. L. and Co.	1	1	[illegible]
Upcot, W.	1	1	
Uttermare, T. B.	2	2	
Vidal, E. U.	1	1	
Veitch, James, sen.	1	1	
Williams, the Lady Mary Hamlyn, Clovelly Court	5	0	
Walrond, J. W.	3	3	
Woolmer, J. N.	2	2	
Woolmer, Rev. C. E. S.	2	2	
Wippell, G. and Sons	1	0	
Wippell, Joseph	0	10	
Wassell, Albert	1	1	
Whitaker, W. (County Surveyor)	3	3	
White, A.	0	10	
Williams, C. Croft	2	2	
Wall,	1	1	
Wilcocks, J.	1	1	
Ward, P., London	1	1	
Yelland, W.	1	1	

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AND CHARING CROSS.

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LAND DRAINAGE AND INCLOSURE COMPA

Established in the Year 1844, and Incorporated by Special Act of Parliament.

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DEPUTY CHAIRMAN.—William Porter, Esq., Hembury Fort, Honiton.

TERMS MUTUALLY ADVANTAGEOUS TO LANDLORDS A TENANTS.

Lands Drained and Improved without any expense whatever to the Owners, a increased Rent paid by the Tenants being sufficient to meet the only payment which lords are required to make, viz., merely the interest of from four to five per cent. Loan; this Company's Act not requiring them to pay off the Principal; all expense be a *permanent* charge on the Property, or made redeemable at any time or liquidate any term of years.

Tenants for *Life*, and mortgagors can likewise Drain and Improve their Estates out any expense to themselves. The works are executed by the Company if w Outfalls through adjoining Lands are obtainable under the Company's Act.

Works are also executed by the Company for parties advancing their own Capi not wishing to borrow the money.

FREDERICK BRODIE, Secretary.
CASTLE STREET, EXET

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34, Parliament Street, London.

MILKEY WHITE, a new Potato introduced by MESSRS. WHEELER and SO Gloucester.

MILKEY WHITE is the best of all Potatoes.

MILKEY WHITE is acknowledged to be the best of all Potatoes; in shape and c flavour and appearance, it excels every other variety; it is as white as milk, as a Fluke, ripens in August, and continues in splendid condition for cooking all th the autumn, winter, and spring.

MILKEY WHITE POTATO—white as milk.

MILKEY WHITE is of the finest quality.

MILKEY WHITE.—Seed Potatoes are very scarce, and early orders are absolutely sary in order to secure a supply. Lowest price, 5s. per peck; 20s. per bushel (

MILKEY WHITE.—Last year the demand for this new and most excellent v greatly exceeded the supply, so that very early in the planting season MI WHEELER & SON were obliged, much to their regret, to decline orders. They have reason to believe that the demand this season will exceed that of last year, they th respectfully urge the importance of ordering whilst they are to be had. The lowest is 5s. per peck (14lbs.), or 20s. per bushel (56lbs).

J. C. WHEELER & SON,
SEED GROWERS, GLOUCES

SUTTON'S GRASS SEEDS FOR ALL

SUTTON'S
GRASS & CLOVER
SEEDS
FOR
Permanent
Pastures,
Reclaimed
Marshes.
Good Black Peaty
Soils,
Chalky Uplands,
Sheep Downs,
Water Meadows,
Churchyards,
Cricket Grounds,
Cultivation with
Liquid Manure.

SUTTON'S BEST MIXTURE FOR LOAM MEDIUM TEXTURE

(or any good Barley Land) contains the followings sort

Achillea millefolium—*Yarrow*
Alopecurus pratensis—*Meadow Foxtail*
Anthoxanthum odoratum—*Sweet Vernaly*
Cynosurus cristatus—*Crested Dogstail*
Dactylis glomerata—*Round Cockefoot*
Festuca duriuscula—*Hard Fescue*
Festuca pratensis—*Meadow Fescue*
Festuca ovina—*Sheep's Fescue*
Festuca rubra—*Reddish Fescue*
Festuca loliacea—*Darnel-leaved Fescue*
Lolium perenne Suttonii—*Sutton's Perennial Rye Grass.*
Lolium perenne Pacey *Rye Grass*
Lolium perenne semp *Grass*
Phleum pratense—*Timoth*
Poa trivialis—*Rough-stalke*
Poa pratense—*Smooth-stal*
Poa sempervirens—*Ever*
Medicago lupulina—*Yell*
Trifolium repens peren
Trifolium pratense per
Trifolium hybridum—*Al*

The above selection of Seeds, mixed in their proper proportions weigh measuring fully 2 bushels, can be supplied of best quality—thoroughly cleaned &c., in one mixture, and the large Seeds in another mixture, at 32s. per acre.

CHEAPER PERMANENT MIXTURES.

These are also supplied at the rate of two bushels per acre, including Clo Grass Seeds in one mixture, but omitting some of the more expensive kinds. per acre.

MESSRS. SUTTON

PREPARE GRASS SEEDS TO SUIT EVERY DESCRIPTIO

Therefore gentlemen intending to lay down Land to New, or to improve O communicate the nature of the soil to be sown, and suitable Seeds will be sup

SPECIAL CONTRACTS MADE FOR LARGE QUANTITIE

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ITON'S CHAMPION SWEDE,

Lowest price quoted on application.

the best Swede in cultivation. It is a large purple-topped yellow variety, perfectly hardy exceedingly well. It is of fine globular shape, and remarkable for its small neck, and om coarse roots. In addition to having taken for six successive years His Late Royal he Prince Consort's Prize Cups of the value of 20 guineas each, these same cups have this warded at the meetings of the Royal East Berks and South Berks Agricultural Societies to ers, Henry Cantrell, Esq., and J. H. Clark, Esq.

RD W. Esq., Isle of

07.—'I Cham- st year s acre. ccesi- of well ge tur- raging s each, ths.'

AMES N, at and F. , Bri- , Bal-

7.—'I with Swedes ow in ctober

NER Esq., Hill,

7.—'I y, that rnace, ntified Cham- e quite of the varie- ndeed,

KINS,

7.—'I prize Den- Funt- ral So- by a mpion from

P R E- , Lyt- Poole,

From Mr. W. BUDDEN, Caunbe and Keynes.

March 18, 1867.—'I gained the 1st prize at the Winfrith Farmers' Club with your Champion Swede, this season. Others also gained prizes with Seeds they had of you.

From Mr. HENRY CANTRELL, Bagita Farm, near Slough.

May 3, 1867.—'I obtained the £5 5s. Silver Cup, given by G. J. Palmer, Esq., Durney Court, last October, for your Champion Swedes, and they were grown after a crop of Italian Rye Grass.'

From Mr. J A M E S COLEMAN, East Kennett, Marlborough.

May 24, 1867.—Your Champion Swede surpasses everything I have seen. I am convinced there is no better cropper, nor any Swede that can stand the winter better.'

From WILLIAM EDMONDS, Esq., Peastie.

February 2, 1867.—'The Champion Swede has turned out a splendid crop this season.'

From Mr. H TAYLOR, Steward to the Right Hon. Lord Falmouth, Trogothnan, Probus, Cornwall.

May 30, 1867.—'I had a very superior crop of your celebrated Champion Swede; the crop was the admiration of all who saw it, undoubtedly the heaviest crop for miles round.'

, 1867.
of Swedes from the Seed
you of your Champion
rste, and the weight per acre

From JAMES PICKERING, Esq., Whitby.

February 19, 1867.—'I was much pleased with your Champion Swede last year. I had a splendid crop, and they still keep very sound.'

For Prices of other Farm Seeds see

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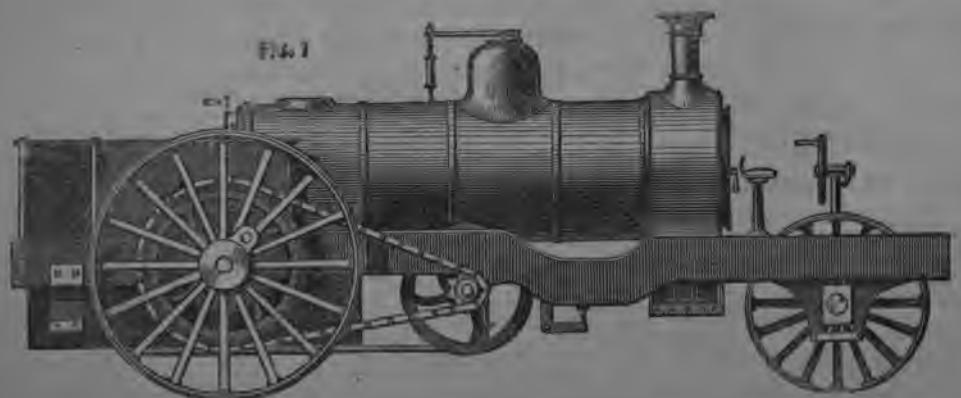
PATENT STEAM CULTIVATING AND TRACTION ENGINE,

To Work on the Double-Engine, Anchor, or Roundabout System.



These Engines are designed with the special object of preventing the constant leakage, wear and tear, and hindrance, caused by the present practice of attaching the Engine, Winding Drums, Traction, and other Gearing to the Boiler, after the model of the old Farm Portable, which for the purpose it was originally designed—driving Thrashing Machines, at a pressure of 40 or 50 pounds per square inch—was excellent; but when it became necessary, for the purposes of steam cultivation, to increase this pressure up to, say 100 or 120 pounds, this model was applied to purposes for which it is totally unfit. In designing an Engine which should avoid the before-mentioned evils, the Patentee adopted the much higher model of the

of the Boiler, leaving room for a large dome on the top of the Boiler, from which is obtained a constant supply of dry steam.—*See "Note of Royal Commission on Steam Cultivation," last Volume of Society's Journal.*

In referring to an Engine and Apparatus under notice, the Report says:—"In this, as in some other Engines which we inspected, we consider there was too small a space for dry steam."

"Engineering," of August 16th, 1867, in an article on "Ploughing Engines," says:—"We find sufficient evidence, after a somewhat extended inquiry, to convince us that the practice of bolting all the machinery of a powerful traction engine to the boiler must be abandoned, and the sooner the better. In working the plant of the Herefordshire Steam Cultivating Company, Mr. Phillips-Smith, the manager, has experienced, and that far too often, the difficulties attending the present mode of fastening all the working parts of ploughing engines to the boilers. His design for ploughing engines, which we published nearly a year ago, is certainly the most sensible yet proposed, and we are in a position to know that the very first agricultural engineers in the kingdom concur this opinion. As in Howards' engines, there is strong independent frame; but unlike Howards' engines, all the working parts are bolted to this frame, the cylinders beneath the boiler, locomotive fashion; while the gearing is incomparably more direct and simple than that of any agricultural engines of this class heretofore made. Not perhaps, the least of the advantages of this arrangement is that of leaving room on the top of the boiler for that stranger to ploughing engines, a steam dome, and no engines need it more. The water supplied to these engines is commonly anything that can be got from a puddle or a ditch, and the engine is hard-worked, so that the knocking out of a cylinder cover now and then is nothing to be wondered at. No engines need steam-domes and scum-cocks more than ploughing engines."

Price of 14-horse Patent Cultivating and Traction Engine, with Two Winding Drums, 1,600 yards of Patent Steel Wire Rope, Double-action Steam Cultivator, all necessary Anchors, Snatch Blocks, Rope Porters, &c., for working on the Stationary Principle £850 0 0

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Price of a 14-horse Patent Traction Engine, without Winding Drums 550 0 0

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SILVER MEDAL for Iron Horse Gears.

COMMENDED: Hand Power Mills.

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ST PRIZE for Crushing Mills.

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ST PRIZE for Steam Power Crushing and Grinding Mills.

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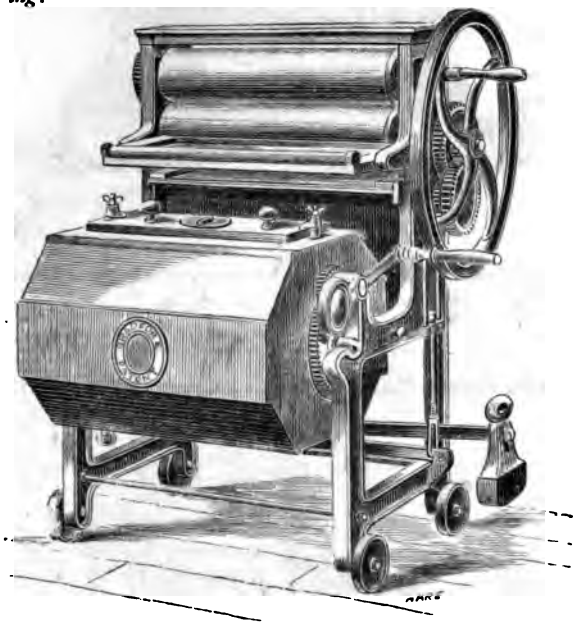
III *Simplicity of Management.*
IV. *Freedom from Mechanical Complication, and non-liability to injure the fabric, or receive injury itself from careless or improper usage.*
V. *Adaptability to the consecutive processes of "firsting," "seconding," and "finishing."*
VI. *Adaptability to any Class of Work, fine or coarse.*
VII. *Economy and direct application of the hand labour, or steam power required.*
VIII. *Economy of material used (soap, water, &c.,) in the washing process.*
IX. *Excellence of Workmanship, and durable character of the Machines generally.*



Bradford's Patent "Vowel" Washing, Wringing, and Mangling Machine.

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„ O.—Hotel, School, or Mansion . . .	12	12	0
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THOMAS BRADFORD & Co., Patentees,

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Bradford's New Patent "Vowel" Washing Machine.

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VOWEL A, equal to 12 Shirts.	3	10	VOWEL A, with B Acorn Wringer	4	18
„ I, „ 20 „ .	5	10	„ I, „ C „ .	7	12
„ U, „ 30 „ .	7	10	„ U, „ D „ .	9	15

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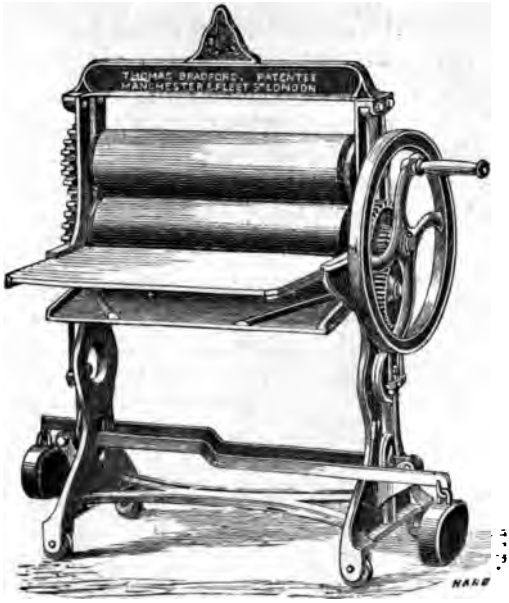
No. C	£2 2s.	No. D, „ „ .	£2 5s.

Bradford's Patent Wringing and Mangling Machine.



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No. 0	2	17	6	24-inch Rollers.	
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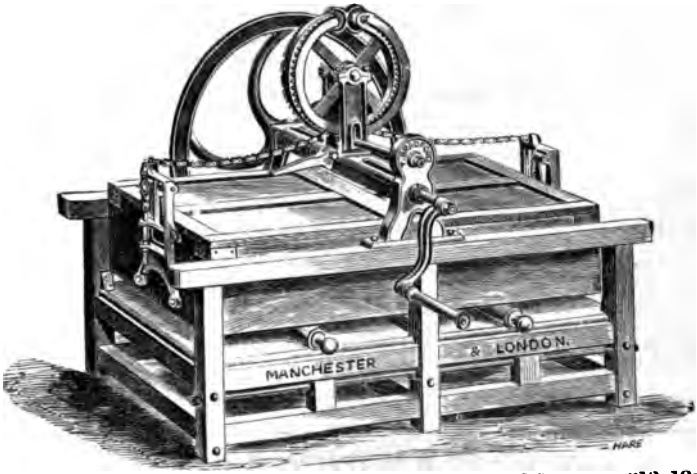

5 feet . . £10 10s. 5 feet 6 inches . . £11 10s. 6 feet . . £12 10s.
6 feet 6 inches . . £14 10s. 7 feet . . £15 10s.

"I am extremely well pleased with the machine; it is ingenious, simple, and very easy to work."

The EMPEROR NAPOLEON, after minutely examining, personally working, and for half an hour witnessing the operation of a "VOWEL" WASHING MACHINE, purchased by the EMPRESS EUGENIE *for the Tuileries, expressed himself as above.*

The "Vowel" Washing Machine. The most *remarkable* triumphs of this now celebrated domestic Machine have, during the last twelve months, been achieved in various districts of the United Kingdom.

Some eight or ten years ago we found it quite impossible to introduce our original Patent Washing Machine into many districts—more particularly into the Eastern and South-Western counties of England, and north of Scotland; the natural prejudice of the local washerwomen being so exceedingly hostile to them that we ourselves became quite indifferent about receiving orders (upon approval) from such districts, knowing the subsequent amount of trouble and annoyance they would entail upon us.

During the last two years, however, this prejudice and hostility to Washing Machines has been so completely overcome, that in several of these very localities we have, either directly or through our various Agents, supplied almost every resident whose means afforded it, either a separate or combined "Vowel" Machine.

As heretofore, we have of course sometimes to contend with isolated cases of individual obstinacy, but we could point to numerous instances in which, under the sensible guidance of some practical housekeeper or housewife, and our "directions for use," a *nurse-girl* has, with one of the "Vowel A" Machines, with the greatest ease, in a *wet wash*, signally defeated many an experienced but prejudiced washerwoman, who, confident in her own acknowledged prowess, did not fear to enter the lists with her young rival and *machine* assistant. And it is such instances as these which we our elves count, that the practical utility of the "Vowel" Machine may be more signally demonstrated; and we have received the acknowledgments of scores of our customers, who have profited by the comfort and economy, as well as the *independence*, they have secured to them selves at so little cost.

We, without any hesitation and in the fullest confidence, recommend every housekeeper or housewife, who has the requisite conveniences, to avail herself of our terms of trial—"one or two months"—before definite purchase, very many have done so during the last two or three years, and the result has been in the highest degree satisfactory, both to purchasers and ourselves, as will be seen from the numerous unsolicited letters from all parts of the kingdom, and from every class of purchaser, in our Illustrated Catalogue.

The best combined family size Machine for Washing, Wringing, and Mangling, is "Vowel E," price £8 8s., delivered carriage free; but the most saleable, because coming more within the reach of every one, is "Vowel A," price £3 10s., as shown in the annexed illustration, upon which can be fixed our Patent "ACME" India-rubber Wringing Machine, capable of wringing every description of article, from a pocket-handkerchief to a large counterpane, as well as shirts and such like, without the slightest injury to buttons, hooks and eyes, &c., and with which any child of twelve years of age can wash and wring a batch of articles equal to ten or twelve shirts, *positively* without fatigue.

The advantage of having a Machine so easily managed, and easily worked, presents itself more especially to *ladies*, from the fact that any lady so inclined can, without fatiguing herself or inconvenience, *satisfy* herself of its advantages by actual personal trial, and we have many illustrious and *Royal* instances; also many instances of ladies washing and finishing those valuable but delicate articles of their attire that they were afraid to trust into the hands of a not always careful laundress.

In addition to this practical and all important success, the "Vowel" Washing Machine has also received during the last three years the highest prizes—in fact, the *only* Medals of the following International Exhibitions:—Paris 1867 Silver Medal; York, 1866; Dublin, 1865, and the Prussian International Exhibition, also in 1865. The Silver Medals of the Royal North Lancashire, Staffordshire, Manchester, and Liverpool Societies have also been awarded this year, 1867. But when it is remembered that the Patentee—our Mr. Bradford—also received a Medal at the London Exhibition, 1862, as well as some eighty other Prizes at various Exhibitions, for his *original* Patent Washing Machine, these more recent and distinctive awards will only present themselves as the result of a long, thorough, and practical acquaintance with the requirements of the Washhouse, whether adapted to the wants of a small private family or the largest public establishment.

A new and complete Illustrated Catalogue of the various modifications of the "Vowel" Washing Machine, ranging from the family size—washing its ten or twelve shirts, blanket, or large counterpane—to the larger sizes for public establishments; also Wringing Machines, Improved Mangles, Linen Presses, Stoves, and all other Laundry requisites as well as Domestic Machinery generally, will be sent free by post, on application to the Patentees and Sole Manufacturers.

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